Chapter 2 Review Problems

INSTRUCTIONS:

You ***do not*** need to write the **question**, ONLY WRITE THE PROBLEM NUMBER and ANSWERS/SOLUTIONS.

- For problems that involve calculations, you must ***show your work*** to get full credit.
- For multiple choice questions, you can simply write the letter (a, b, c, or d) of the correct response.
- Use the *navigation buttons* at the bottom of the pages to get hints, check your answers, move to the next problem, or go back to previous pages.

Chapter Review Problems are **due** at the ***end of class period*** on the dates shown in the CHEM 108 Schedule.

- Late submissions will not be accepted unless the student can prove to the instructor that something outside of their control prevented them from turning in the problem set on the due date (see the course syllabus for more details).

Go to first question

2.1) Indicate whether each of the following statements about the nucleus of an atom is **true** or **false**.

a) The nucleus of an atom is neutral (total charge = 0).

b) The nucleus of an atom contains only neutrons.

c) The mass number is equal to the number of electrons present outside the nucleus.

d) The nucleus accounts for almost all the volume (size) of an atom.

e) The nucleus accounts for almost all the mass (weight) of an atom.

f) The nucleus can have a positive or negative charge depending on the identity of the atom.

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Go to next question

2.1) Indicate whether each of the following statements about the nucleus of an atom is **true** or **false**.

a) The nucleus of an atom is neutral (total charge = 0).

b) The nucleus of an atom contains only neutrons.

c) The mass number is equal to the number of electrons present outside the nucleus.

d) The nucleus accounts for almost all the volume (size) of an atom.

e) The nucleus accounts for almost all the mass (weight) of an atom.

f) The nucleus can have a positive or negative charge depending on the identity of the atom.

HINT: Protons and neutrons are compacted together in the **nucleus** of atoms. Electrons are distributed in space around the nucleus and can be thought of as moving very fast in a volume surrounding the nucleus. The nucleus is the very small, dense core of an atom. An electron weighs about 1/2000th of a proton or a neutron.

Atoms are mostly empty space. Consider an analogy with familiar objects. If the nucleus (protons and neutrons) is represented by a golf ball placed on the pitcher's mound of a baseball field, then the region occupied by electron(s) moving around the nucleus would be about the size of the baseball stadium and its parking lot!

An atom, as a whole, is neutral; it has no net (total) charge. The reason for this is that equal numbers of protons and electrons are always present in an atom.

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For more help: See chapter 2 part 2 video or chapter 2 section 3 in the textbook.

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Go to next question

2.1) Indicate whether each of the following statements about the nucleus of an atom is **true** or **false**.

a) The nucleus of an atom is neutral (total charge = 0). **false**

- The nucleus contain protons which are positive, and neutron, which are uncharged, therefore it has a net positive charge.

b) The nucleus of an atom contains only neutrons. **false**

- The nucleus of atom will always contain at least one proton.

c) The mass number is equal to the number of electrons present outside the nucleus. **false**

- The mass number is equal to the number of protons plus the number of neutrons.

d) The nucleus accounts for almost all the volume (size) of an atom. **false**

- The nucleus is the very **small**, dense core of an atom. It is the space that the electrons occupy that accounts for almost all the volume of an atom.

e) The nucleus accounts for almost all the mass (weight) of an atom. **true**

- The nucleus contain protons and neutrons; protons and neutrons are about 2000 times heavier than electrons.

f) The nucleus can have a positive or negative charge depending on the identity of the atom. **false**

- The nucleus contain protons which are positive, and neutron, which are uncharged, therefore it has a net positive charge.

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For more details: See chapter 2 part 2 video or chapter 2 section 3 in the textbook.

Go to next question

2.2) Redraw the table below and then fill in the missing information for the particular atom in each of the column.

Element:	Se		
Mass number:	70	65	
Number of neutrons:		36	35
Number of protons:			36

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Go to next question

2.2) Redraw the table below and then fill in the missing information for the particular atom in each of the column.

Element:	Se		
Mass number:	70	65	
Number of neutrons:		36	35
Number of protons:			36

HINT: The **number of protons** a particular atom contains determines that atom's identity. We differentiate atoms with a particular number of protons by their names.

- For example, any atom that contains just one proton is called hydrogen. An atom with two protons is called helium. An atom with six protons is called carbon.

The ***mass number*** of an atom is defined as *the number of protons* ***plus*** *the number of neutrons*.

For more help: See chapter 2 part 2 video or chapter 2 section 3 in the textbook.

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Go to next question

2.2) Redraw the table below and then fill in the missing information for the particular atom in each of the column.

Element:	Se	Cu	Kr
Mass number:	70	65	71
Number of neutrons:	36	36	35
Number of protons:	34	29	36

EXPLANATION: The **number of protons** a particular atom contains determines that atom's identity. We differentiate atoms with a particular number of protons by their names.

- For example, any atom that contains just one proton is called hydrogen. An atom with two protons is called helium. An atom with six protons is called carbon.

The ***mass number*** of an atom is defined as *the number of protons* ***plus*** *the number of neutrons*. Whenever you know the number of neutrons and the number of protons (atomic number or element name), you can determine the mass number.

mass number = number of protons + number of neutrons

Likewise, whenever you know the mass number and the number of protons (atomic number or element name), you can determine the number of neutrons. The reason for this is that rearranging the equation above to solve for the number of neutrons gives:

number of neutrons = mass number - number of protons

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For more details: See chapter 2 part 2 video or chapter 2 section 3 in the textbook.

Go to next question

2.3) Which one of the following statements is true for an isotope of a particular element?

a) Isotopes of a particular element have the same number of neutrons but a different number of protons.

b) Isotopes of a particular element have the same number of protons but a different number of neutrons.

c) Isotopes of a particular element have a different number of protons and a different number of neutrons.

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Click here for a **hint**

Click here to **check your answer**

Go to next question

2.3) Which one of the following statements is true for an isotope of a particular element?

a) Isotopes of a particular element have the same number of neutrons but a different number of protons.

b) Isotopes of a particular element have the same number of protons but a different number of neutrons.

c) Isotopes of a particular element have a different number of protons and a different number of electrons.

HINT: See the chapter 2 part 2 video or read about isotopes in chapter 2 section 3 in the textbook.

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Go to next question

2.3) Which one of the following statements is true for an isotope of a particular element?

~~a) Isotopes of a particular element have the same number of neutrons but a different number of protons.~~

b) Isotopes of a particular element have the same number of protons but a different number of neutrons. ⟵ **TRUE**

~~c) Isotopes of a particular element have a different number of protons and a different number of electrons.~~

EXPLANATION: Atoms of a particular element ***do not all have the same number of neutrons***. Consider the element carbon as an example. Some carbon atoms have 6 neutrons, some have 7, and some have 8 neutrons. If you had a pile of carbon atoms in front of you and you were able to magically reach in and grab a single carbon atom, you would have about a 99% chance of grabbing a carbon with 6 neutrons, about a 1% chance of grabbing a carbon atom with 7 neutrons, and about a 0.1% chance of grabbing a carbon atom with 8 neutrons. These three different forms of carbon are called ***isotopes*** of carbon. **Isotopes** are defined as atoms with the *same* number of protons (same element), but a *different* number of neutrons.

For more details: See chapter 2 part 2 video or chapter 2 section 3 in the textbook.

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2.4) An atom's *"**atomic number**"* is the number of protons it contains and can be found on the periodic table. The ***mass number*** of an atom is defined as *the number of protons **plus** the number of neutrons*. When considering isotopes, a shorthand notation is often used in which the *mass number is written as a* superscript to the left of the atomic symbol. For example, consider the three isotopes of carbon in the table below.

NUMBER OF NEUTRONS IN THE CARBON ATOM	SHORTHAND NOTATION
6	^{12}C
7	^{13}C
8	^{14}C

All carbon atoms have six protons (***atomic number*** = 6). The number of neutrons vary, so the ***mass number*** varies.

QUESTION: ^{18}F is administered to patients in order to monitor brain activity. How many neutrons are in ^{18}F?

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Go to next question

2.4) An atom's *"**atomic number**"* is the number of protons it contains and can be found on the periodic table. The ***mass number*** of an atom is defined as *the number of protons **plus** the number of neutrons*. When considering isotopes, a shorthand notation is often used in which the *mass number is written as a* superscript to the left of the atomic symbol. For example, consider the three isotopes of carbon in the table below.

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All carbon atoms have six protons (***atomic number*** = 6). The number of neutrons vary, so the ***mass number*** varies.

QUESTION: ^{18}F is administered to patients in order to monitor brain activity. How many neutrons are in ^{18}F?

HINT: Whenever you know the number of neutrons and the number of protons (atomic number or element name), you can determine the mass number.

mass number = number of protons + number of neutrons

Likewise, whenever you know the mass number and the number of protons (atomic number or element name), you can determine the number of neutrons. The reason for this is that rearranging the equation above to solve for the number of neutrons gives:

number of neutrons = mass number - number of protons

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For more help: See chapter 2 part 2 video or chapter 2 section 3 in the textbook.

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Go to next question

2.4) An atom's *"**atomic number**"* is the number of protons it contains and can be found on the periodic table. The ***mass number*** of an atom is defined as *the number of protons **plus** the number of neutrons*. When considering isotopes, a shorthand notation is often used in which the *mass number is written as a* superscript to the left of the atomic symbol. For example, consider the three isotopes of carbon in the table below.

NUMBER OF NEUTRONS IN THE CARBON ATOM	SHORTHAND NOTATION
6	^{12}C
7	^{13}C
8	^{14}C

All carbon atoms have six protons (***atomic number*** = 6). The number of neutrons vary, so the ***mass number*** varies.

QUESTION: ^{18}F is administered to patients in order to monitor brain activity. How many neutrons are in ^{18}F?

ANSWER: 9 neutrons

EXPLANATION: **mass number = number of protons + number of neutrons**

All fluorine atoms have 9 protons (atomic number = 9). So for ^{18}F:

18 = 9 + number of neutrons

Rearranging the equation above to solve for the number of neutrons gives:

number of neutrons = 18 - 9 = 9 neutrons

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For more details: See chapter 2 part 2 video or chapter 2 section 3 in the textbook.

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2.5) Classify each of these elements as metal or nonmetal.

a) Ne

b) F

c) Na

d) Fe

e) Cr

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Go to next question

2.5) Classify each of these elements as metal or nonmetal.

a) Ne

b) F

c) Na

d) Fe

e) Cr

HINT: Use the element's *position in the periodic table* to determine if it is a metal or nonmetal.

For more help: See chapter 2 part 5 video or chapter 2 section 5 in the textbook.

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Click here to **check your answer**

Go to next question

2.5) Classify each of these elements as metal or nonmetal.

a) Ne **nonmetal**

b) F **nonmetal**

c) Na **metal**

d) Fe **metal**

e) Cr **metal**

EXPLANATION: Use the element's *position in the periodic table* to determine if it is a metal or nonmetal.

For more details:
See chapter 2 part 5 video or chapter 2 section 5 in the textbook.

Periodic Arrangement of Metals, Nonmetals, and Metalloids

1 H			Metals (Green)			Nonmetals (Blue)			Metalloids (Red)								2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt									

58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

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2.6) A sample contains 1.43×10^{24} carbon ***atoms***. How many ***moles*** of carbon are in the sample?

REMINDER: Be sure to use the correct number of significant figures in your answer.

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2.6) A sample contains 1.43×10^{24} carbon ***atoms***. How many ***moles*** of carbon are in the sample?

HINT: This is a *unit conversion problem*. Convert from units of "atoms" to units of "moles." You need to know the relationship between atoms and moles; we use Avogadro's Number: 6.022×10^{23} atoms = 1 mole.

For more help: See chapter 2 part 3 video or chapter 2 section 4 in the textbook.

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2.6) A sample contains 1.43×10^{24} carbon ***atoms***. How many ***moles*** of carbon are in the sample?

ANSWER: 2.37 moles

Your answer should have ***three*** significant figures.

CLICK HERE to see the **complete solution** for this problem

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2.6) A sample contains 1.43×10^{24} carbon ***atoms***. How many ***moles*** of carbon are in the sample?

ANSWER: 2.37 moles

EXPLANATION: The relationship between atoms and moles, 6.022×10^{23} atoms = 1 mole, is used as a ***conversion factor***.

$$\frac{1.43 \times 10^{24} \text{ C atoms}}{\left|\begin{array}{c} 1 \text{ mole C} \\ \hline 6.022 \times 10^{23} \text{ C atoms} \end{array}\right.} = \textbf{2.37 moles C}$$

For more details: See chapter 2 part 3 video or chapter 2 section 4 in the textbook.

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2.7) A sample contains 1.65×10^{24} zinc ***atoms***. How many ***moles*** of zinc are in the sample?

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2.7) A sample contains 1.65×10^{24} zinc ***atoms***. How many ***moles*** of zinc are in the sample?

HINT: This is a *unit conversion problem*. Convert from units of "atoms" to units of "moles." You need to know the relationship between atoms and moles; we use Avogadro's Number: 6.022×10^{23} atoms = 1 mole.

For more help: See chapter 2 part 3 video or chapter 2 section 4 in the textbook.

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2.7) A sample contains 1.65×10^{24} zinc ***atoms***. How many ***moles*** of zinc are in the sample?

ANSWER: 2.74 moles

Your answer should have ***three*** significant figures.

CLICK HERE to see the **complete solution** for this problem

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2.7) A sample contains 1.65×10^{24} zinc ***atoms***. How many ***moles*** of zinc are in the sample?

ANSWER: 2.74 moles

EXPLANATION: The relationship between atoms and moles, 6.022×10^{23} atoms = 1 mole, is used as a ***conversion factor***.

$$\frac{1.65 \times 10^{24} \text{ Zn atoms}}{\dfrac{1 \text{ mole Zn}}{6.022 \times 10^{23} \text{ Zn atoms}}} = \mathbf{2.74 \text{ moles Zn}}$$

For more details: See chapter 2 part 3 video or chapter 2 section 4 in the textbook.

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2.8) A sample contains 0.75 moles of silicon (Si). How many silicon ***atoms*** are in the sample?

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2.8) A sample contains 0.75 moles of silicon (Si). How many silicon ***atoms*** are in the sample?

HINT: This is a *unit conversion problem*. Convert from units of "moles" to units of "atoms." You need to know the relationship between moles and atoms; we use Avogadro's Number: 6.022×10^{23} atoms = 1 mole.

For more help: See chapter 2 part 3 video or chapter 2 section 4 in the textbook.

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2.8) A sample contains 0.75 moles of silicon (Si). How many silicon ***atoms*** are in the sample?

ANSWER: 4.5×10^{23} Si atoms

Your answer should have ***two*** significant figures.

CLICK HERE to see the **complete solution** for this problem

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2.8) A sample contains 0.75 moles of silicon (Si). How many silicon ***atoms*** are in the sample?

ANSWER: 4.5 x 10^{23} Si atoms

EXPLANATION: The relationship between atoms and moles, 6.022 x 10^{23} atoms = 1 mole, is used as a ***conversion factor***.

$$0.75 \text{ moles Si} \times \frac{6.022 \times 10^{23} \text{ Si atoms}}{1 \text{ mole Si}} = 4.5 \times 10^{23} \text{ Si atoms}$$

For more details: See chapter 2 part 3 video or chapter 2 section 4 in the textbook.

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2.9) A sample contains 0.33 ***moles*** of Magnesium (Mg). How many magnesium ***atoms*** are in the sample?

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2.9) A sample contains 0.33 ***moles*** of Magnesium (Mg). How many magnesium ***atoms*** are in the sample?

HINT: This is a *unit conversion problem*. Convert from units of "***moles***" to units of "***atoms***." You need to know the relationship between moles and atoms; we use Avogadro's Number: 6.022×10^{23} atoms = 1 mole.

For more help: See chapter 2 part 3 video or chapter 2 section 4 in the textbook.

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2.9) A sample contains 0.33 ***moles*** of Magnesium (Mg). How many magnesium ***atoms*** are in the sample?

ANSWER: 2.0 x 10^{23} Mg atoms

Your answer should have ***two*** significant figures.

CLICK HERE to see the **complete solution** for this problem

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2.9) A sample contains 0.33 ***moles*** of Magnesium (Mg). How many magnesium ***atoms*** are in the sample?

ANSWER: 2.0 x 10^{23} Mg atoms

EXPLANATION: The relationship between atoms and moles, 6.022 x 10^{23} atoms = 1 mole, is used as a ***conversion factor***.

$$\frac{0.33 \text{ moles Mg}}{\left|\begin{array}{c} 6.022 \times 10^{23} \text{ Mg atoms} \\ \hline 1 \text{ mole Mg} \end{array}\right.} = 2.0 \times 10^{23} \text{ Mg atoms}$$

For more details: See chapter 2 part 3 video or chapter 2 section 4 in the textbook.

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2.10) A sample contains 1.78 ***moles*** of magnesium (Mg). How many ***grams*** of magnesium are in the sample?

IMPORTANT NOTE: In order for your answers to ***exactly*** match the solutions provided for review problems (and worksheet problems), round ***molar masses*** to **two digits** *to the right of the decimal point* when possible.

- For example, use 24.31 grams/mole for the ***molar mass*** of magnesium.

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2.10) A sample contains 1.78 ***moles*** of magnesium (Mg). How many ***grams*** of magnesium are in the sample?

HINT: This is a *unit conversion problem*. Convert from units of "***moles***" to units of "***grams***." The relationship between ***moles*** and ***grams*** of a particular element is called the **molar mass**. The molar mass for each element is written under the element's name/symbol in the periodic table.

For more help: See chapter 2 part 4 video or chapter 2 section 4 in the textbook.

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2.10) A sample contains 1.78 ***moles*** of magnesium (Mg). How many ***grams*** of magnesium are in the sample?

ANSWER: 43.3 grams Mg

Your answer should have ***three*** significant figures.

CLICK HERE to see the **complete solution** for this problem

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2.10) A sample contains 1.78 ***moles*** of magnesium (Mg). How many ***grams*** of magnesium are in the sample?

ANSWER: 43.3 grams Mg

EXPLANATION: The relationship between ***moles*** and and ***grams*** is the ***molar mass***. The molar mass of magnesium is 24.31 g/mole (1 mole Mg = 24.31 grams Mg); this quantity is used as a ***conversion factor***.

$$1.78 \text{ moles Mg} \times \frac{24.31 \text{ grams Mg}}{1 \text{ mole Mg}} = 43.3 \text{ grams Mg}$$

For more details: See chapter 2 part 4 video or chapter 2 section 4 in the textbook.

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2.11) A sample contains 5.18 ***moles*** of gold (Au). How many ***grams*** of gold are in the sample?

REMINDER: Round ***molar masses*** to **two digits** *to the right of the decimal point* when possible.

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Go to next question

2.11) A sample contains 5.18 ***moles*** of gold (Au). How many ***grams*** of gold are in the sample?

HINT: This is a *unit conversion problem*. Convert from units of "***moles***" to units of "***grams***." The relationship between ***moles*** and ***grams*** of a particular element is called the **molar mass**. The molar mass for each element is written under the element's name/symbol in the periodic table.

For more help: See chapter 2 part 4 video or chapter 2 section 4 in the textbook.

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Click here to **check your answer**

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2.11) A sample contains 5.18 ***moles*** of gold (Au). How many ***grams*** of gold are in the sample?

ANSWER: 1020 grams Au

Your answer should have ***three*** significant figures. The absence of a decimal point in "1020" indicates that the right-most zero is not significant.

CLICK HERE to see the **complete solution** for this problem

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2.11) A sample contains 5.18 ***moles*** of gold (Au). How many ***grams*** of gold are in the sample?

ANSWER: 1020 grams Au

EXPLANATION: The relationship between ***moles*** and and ***grams*** is the ***molar mass***. The molar mass of gold is 196.97 g/mole (1 mole Au = 196.97 grams Au); this quantity is used as a ***conversion factor***.

$$\frac{5.18 \text{ moles Au}}{\left|\frac{196.97 \text{ grams Au}}{1 \text{ mole Au}}\right.} = 1020 \text{ grams Au}$$

For more details: See chapter 2 part 4 video or chapter 2 section 4 in the textbook.

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2.12) A sample contains 0.436 ***grams*** of helium (He). How many ***moles*** of helium are in the sample?

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2.12) A sample contains 0.436 ***grams*** of helium (He). How many ***moles*** of helium are in the sample?

HINT: This is a *unit conversion problem*. Convert from units of "***grams***" to units of "***moles***." The relationship between ***grams*** and ***moles*** of a particular element is called the **molar mass**. The molar mass for each element is written under the element's name/symbol in the periodic table.

For more help: See chapter 2 part 4 video or chapter 2 section 4 in the textbook.

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2.12) A sample contains 0.436 ***grams*** of helium (He). How many ***moles*** of helium are in the sample?

ANSWER: 0.109 moles He

Your answer should have ***three*** significant figures.

CLICK HERE to see the **complete solution** for this problem

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2.12) A sample contains 0.436 ***grams*** of helium (He). How many ***moles*** of helium are in the sample?

ANSWER: 0.109 moles He

EXPLANATION: The relationship between ***moles*** and and ***grams*** is the ***molar mass***. The molar mass of helium is 4.00 g/mole (1 mole He = 4.00 grams He); this quantity is used as a ***conversion factor***.

$$0.436 \text{ grams He} \times \frac{1 \text{ mole He}}{4.00 \text{ grams He}} = 0.109 \text{ moles He}$$

For more details: See chapter 2 part 4 video or chapter 2 section 4 in the textbook.

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2.13) How many calcium ***atoms*** are present in 129 ***grams*** of calcium (Ca)?

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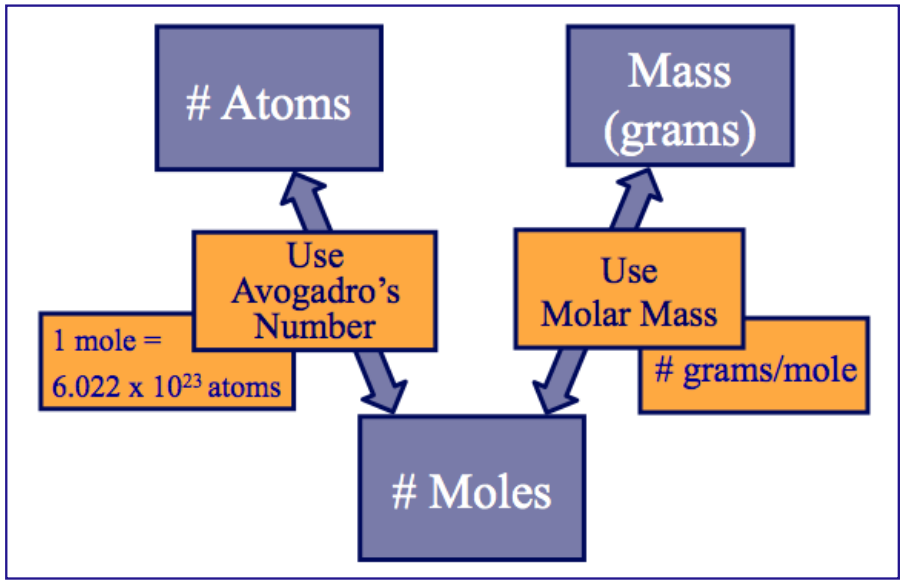
2.13) How many calcium ***atoms*** are present in 129 ***grams*** of calcium (Ca)?

HINT: This is a **TWO-STEP** *unit conversion problem*. First, convert from ***grams*** to ***moles***, and then convert from ***moles*** to ***atoms***. You may find the conversion map shown below to be helpful when doing atoms/moles/grams calculations:



REMINDER: Round ***molar masses*** to **two digits** *to the right of the decimal point* when possible.

For more help: See chapter 2 part 4 video or chapter 2 section 4 in the textbook.

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Click here to **check your answer**

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2.13) How many calcium ***atoms*** are present in 129 ***grams*** of calcium (Ca)?

ANSWER: 1.94×10^{24} Ca atoms

Your answer should have ***three*** significant figures.

CLICK HERE to see the **complete solution** for this problem

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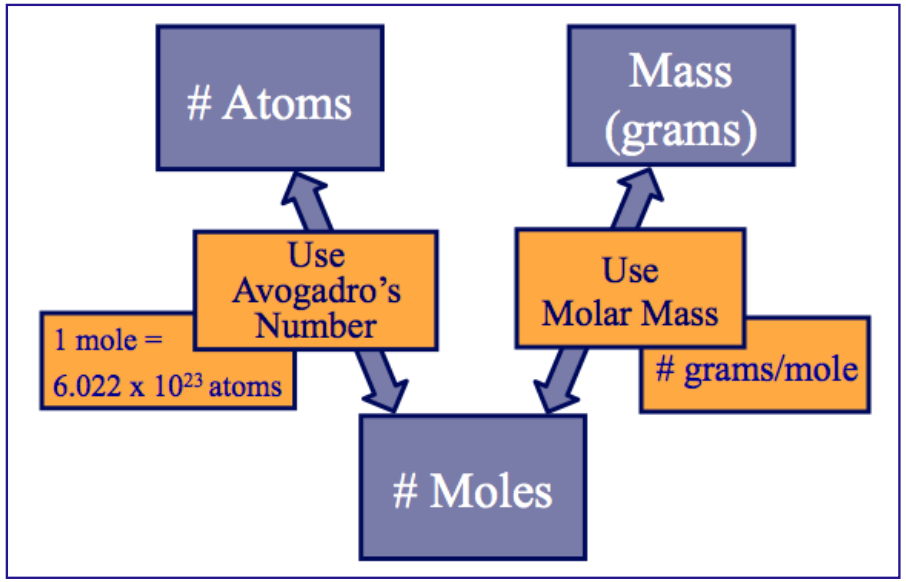
2.13) How many calcium ***atoms*** are present in 129 ***grams*** of calcium (Ca)? **ANSWER: 1.94 x 10^{24} Ca atoms**

EXPLANATION: This is a **TWO STEP** *unit conversion problem*.

First step: convert from ***grams*** to ***moles***:

$$\frac{129 \text{ grams Ca}}{\left|\begin{array}{c} 1 \text{ mole Ca} \\ \hline 40.08 \text{ grams Ca} \end{array}\right.} = 3.218562 \text{ moles Ca (unrounded)}$$

NOTE: When doing two-step conversion, do not round the calculator's values until the second step.



Second step: convert from ***moles*** to ***atoms***:

$$\frac{3.218562 \text{ moles Ca}}{\left|\begin{array}{c} 6.022 \times 10^{23} \text{ Ca atoms} \\ \hline 1 \text{ mole Ca} \end{array}\right.} = \mathbf{1.94 \times 10^{24} \text{ Ca atoms}}$$

Alternatively, these two steps can be combined into one equation:

$$\frac{129 \text{ grams Ca}}{\left|\begin{array}{c} 1 \text{ mole Ca} \\ \hline 40.08 \text{ grams Ca} \end{array}\right.} \times \frac{6.022 \times 10^{23} \text{ Ca atoms}}{1 \text{ mole Ca}} = \mathbf{1.94 \times 10^{24} \text{ Ca atoms}}$$

For more details: See chapter 2 part 4 video or chapter 2 section 4 in the textbook.

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2.14) What is the mass (grams) of 2.5×10^{19} silver (Ag) atoms?

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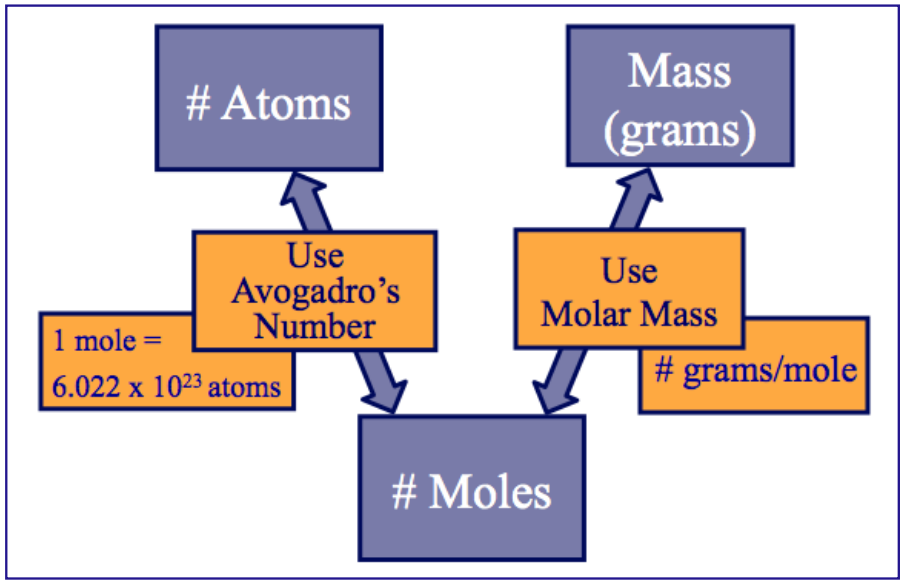
Click here for a **hint**

Click here to **check your answer**

Go to next question

2.14) What is the mass (grams) of 2.5×10^{19} silver (Ag) atoms?

HINT: This is a **TWO-STEP** *unit conversion problem*. First, convert from ***atoms*** to ***moles***, and then convert from ***moles*** to ***grams***. You may find the conversion map shown below to be helpful when doing atoms/moles/grams calculations:



REMINDER: Round ***molar masses*** to **two digits** *to the right of the decimal point* when possible.

For more help: See chapter 2 part 4 video or chapter 2 section 4 in the textbook.

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Click here to **check your answer**

Go to next question

2.14) What is the mass (grams) of 2.5×10^{19} silver (Ag) atoms?

ANSWER: 4.5×10^{-3} grams Ag (**or** 0.0045 grams Ag)

Your answer should have ***two*** significant figures.

CLICK HERE to see the **complete solution** for this problem

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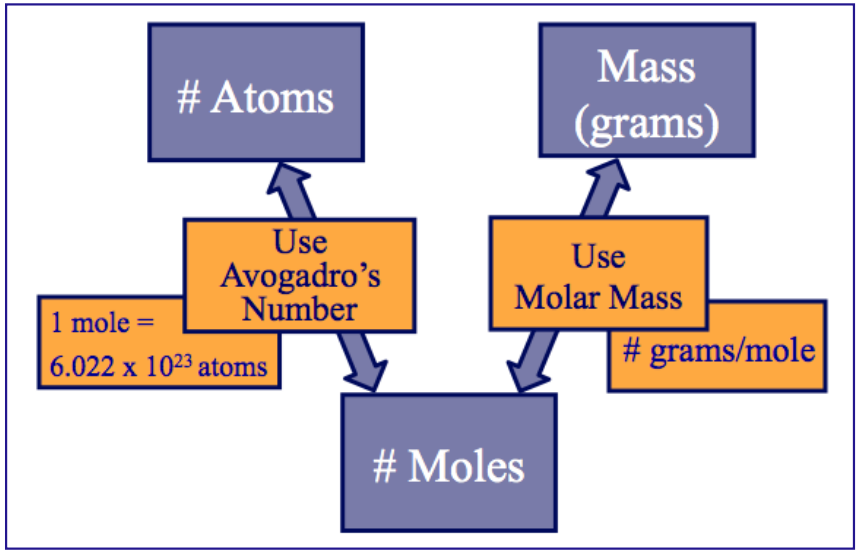
2.14) What is the mass (grams) of 2.5×10^{19} silver (Ag) atoms? **ANSWER:** 4.5×10^{-3} grams Ag (**or** 0.0045 grams Ag)

EXPLANATION: This is a **TWO STEP** *unit conversion problem*.

First step: convert from ***atoms*** to ***moles***:

$$\frac{2.5 \times 10^{19} \text{ Ag atoms} \quad | \quad 1 \text{ mole Ag}}{6.022 \times 10^{23} \text{ Ag atoms}} = 4.1514447 \times 10^{-5} \text{ moles Ag (unrounded)}$$



NOTE: When doing two-step conversion, do not round the calculator's values until the second step.

Second step: convert from ***moles*** to ***grams***:

$$\frac{4.1514447 \times 10^{-5} \text{ moles Ag} \quad | \quad 107.87 \text{ grams Ag}}{1 \text{ mole Ag}} = 4.5 \times 10^{-3} \text{ grams Ag}$$

(or 0.0045 grams Ag)

Alternatively, these two steps can be combined into one equation:

$$\frac{2.5 \times 10^{19} \text{ Ag atoms} \quad | \quad 1 \text{ mole Ag} \quad | \quad 107.87 \text{ grams Ag}}{6.022 \times 10^{23} \text{ Ag atoms} \quad | \quad 1 \text{ mole Ag}} = 4.5 \times 10^{-3} \text{ grams Ag}$$

For more details: See chapter 2 part 4 video or chapter 2 section 4 in the textbook.

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Go to next question

2.15) How many sulfur ***atoms*** are present in 151 ***grams*** of sulfur (S)?

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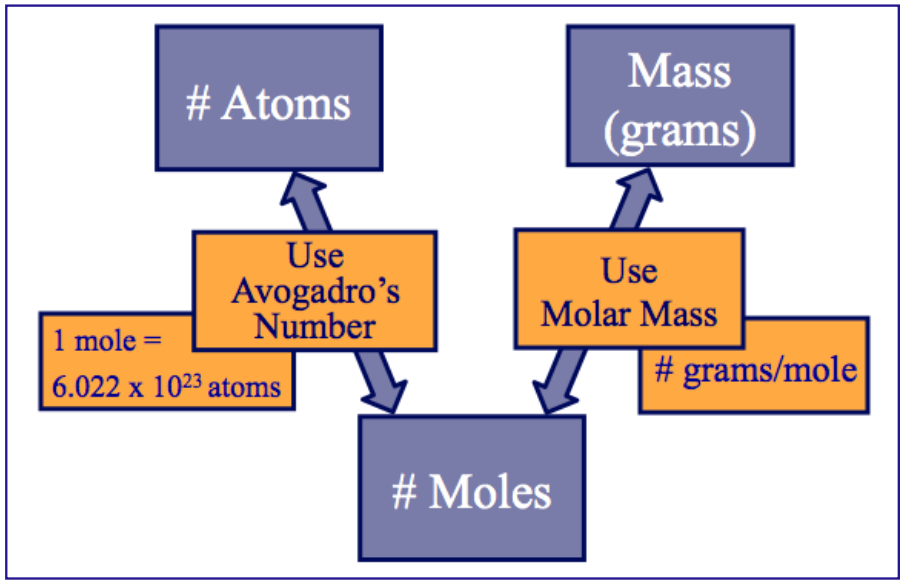
Click here for a **hint**

Click here to **check your answer**

Go to next question

2.15) How many sulfur ***atoms*** are present in 151 ***grams*** of sulfur (S)?

HINT: This is a **TWO-STEP** *unit conversion problem*. First, convert from ***grams*** to ***moles***, and then convert from ***moles*** to ***atoms***. You may find the conversion map shown below to be helpful when doing atoms/moles/grams calculations:



REMINDER: Round ***molar masses*** to **two digits** *to the right of the decimal point* when possible.

For more help: See chapter 2 part 4 video or chapter 2 section 4 in the textbook.

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Click here to **check your answer**

Go to next question

2.15) How many sulfur ***atoms*** are present in 151 ***grams*** of sulfur (S)?

ANSWER: 2.84 x 10^{24} S atoms

Your answer should have ***three*** significant figures.

CLICK HERE to see the **complete solution** for this problem

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Go to next question

2.15) How many sulfur ***atoms*** are present in 151 ***grams*** of sulfur (S)? **ANSWER: 2.84 x 10^{24} S atoms**

EXPLANATION: This is a **TWO STEP** *unit conversion problem*.

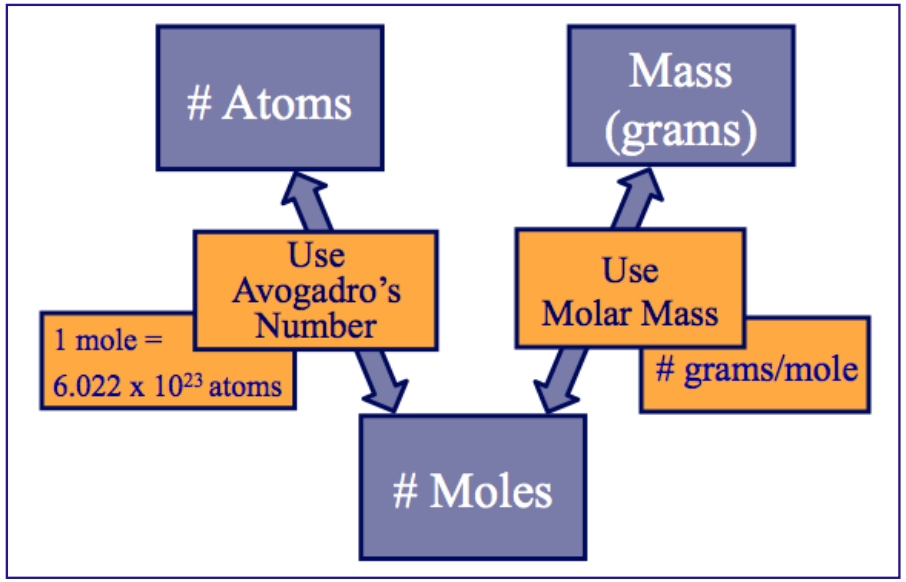
First step: convert from ***grams*** to ***moles***:

$$\frac{151 \text{ grams S}}{\left|\begin{array}{c} 1 \text{ mole S} \\ \hline 32.07 \text{ grams S} \end{array}\right.} = 4.7088450 \text{ moles S (unrounded)}$$

NOTE: When doing two-step conversion, do not round the calculator's values until the second step.

Second step: convert from ***moles*** to ***atoms***:

$$\frac{4.7088450 \text{ moles S}}{\left|\begin{array}{c} 6.022 \times 10^{23} \text{ S atoms} \\ \hline 1 \text{ mole S} \end{array}\right.} = \mathbf{2.84 \times 10^{24} \text{ S atoms}}$$



Alternatively, these two steps can be combined into one equation:

$$\frac{151 \text{ grams S}}{\left|\begin{array}{c} 1 \text{ mole S} \\ \hline 32.07 \text{ grams S} \end{array}\right.} \frac{\left|\begin{array}{c} 6.022 \times 10^{23} \text{ S atoms} \\ \hline 1 \text{ mole S} \end{array}\right.}{} = \mathbf{2.84 \times 10^{24} \text{ S atoms}}$$

For more details: See chapter 2 part 4 video or chapter 2 section 4 in the textbook.

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Go to next question

2.16) What is the mass (grams) of 5.77×10^{23} argon (Ar) atoms?

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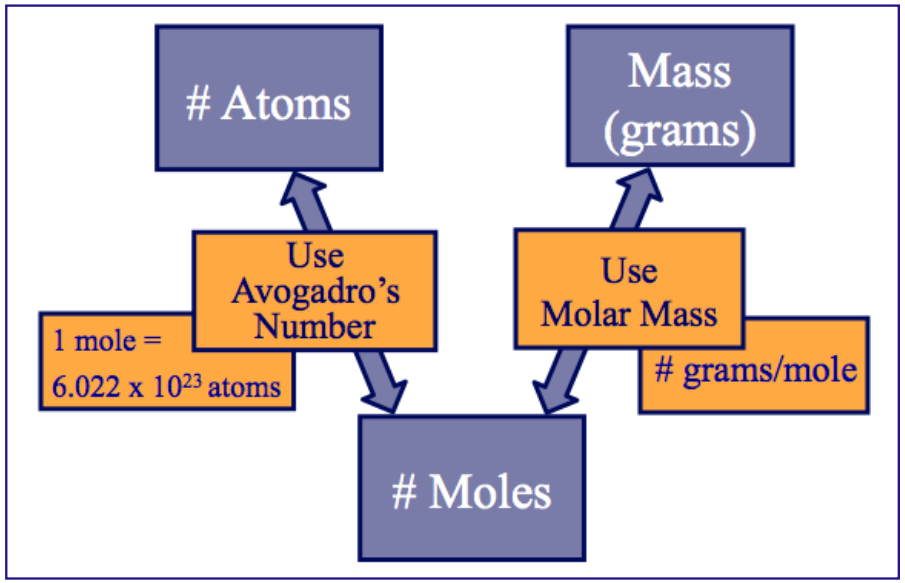
Click here for a **hint**

Click here to **check your answer**

This is the last chapter 2 review problem

2.16) What is the mass (grams) of 5.77×10^{23} argon (Ar) atoms?

HINT: This is a **TWO-STEP** *unit conversion problem*. First, convert from ***atoms*** to ***moles***, and then convert from ***moles*** to ***grams***. You may find the conversion map shown below to be helpful when doing atoms/moles/grams calculations:



REMINDER: Round ***molar masses*** to **two digits** *to the right of the decimal point* when possible.

For more help: See chapter 2 part 4 video or chapter 2 section 4 in the textbook.

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Click here to **check your answer**

This is the last chapter 2 review problem

2.16) What is the mass (grams) of 5.77×10^{23} argon (Ar) atoms?

ANSWER: 38.3 grams

Your answer should have ***three*** significant figures.

CLICK HERE to see the **complete solution** for this problem

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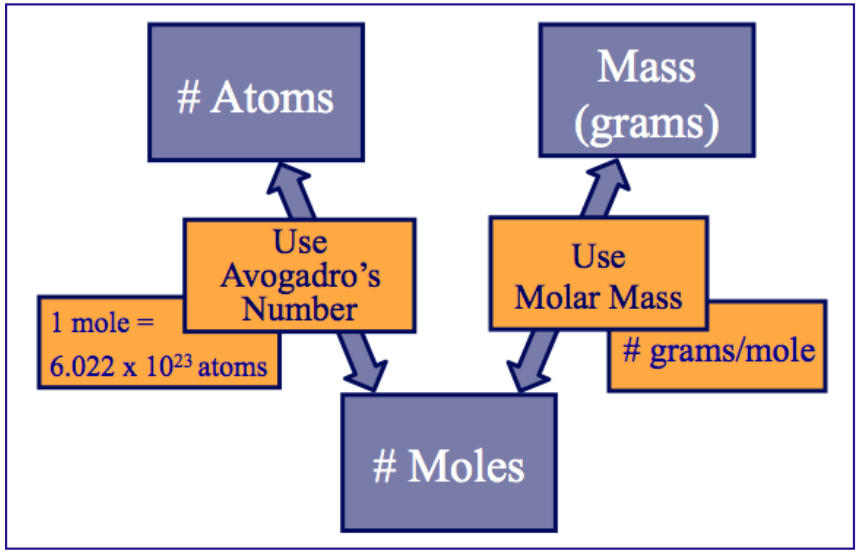
This is the last chapter 2 review problem

2.16) What is the mass (grams) of 5.77×10^{23} argon (Ar) atoms? **ANSWER:** 38.3 grams

EXPLANATION: This is a **TWO STEP** *unit conversion problem*.

First step: convert from ***atoms*** to ***moles***:

$$\frac{5.77 \times 10^{23} \text{ Ar atoms}}{} \left| \frac{1 \text{ mole Ar}}{6.022 \times 10^{23} \text{ Ar atoms}} \right. = 0.9581534 \text{ moles Ar (unrounded)}$$



NOTE: When doing two-step conversion, do not round the calculator's values until the second step.

Second step: convert from ***moles*** to ***grams***:

$$\frac{0.9581534 \text{ moles Ar}}{} \left| \frac{39.95 \text{ grams Ar}}{1 \text{ mole Ar}} \right. = 38.3 \text{ grams Ar}$$

Alternatively, these two steps can be combined into one equation:

$$\frac{5.77 \times 10^{23} \text{ Ar atoms}}{} \left| \frac{1 \text{ mole Ar}}{6.022 \times 10^{23} \text{ Ar atoms}} \right| \frac{39.95 \text{ grams Ar}}{1 \text{ mole Ar}} = 38.3 \text{ grams Ar}$$

For more details: See chapter 2 part 4 video or chapter 2 section 4 in the textbook.

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End of Chapter 2 Review Problems