Homework 01 - Chemistry Fundamentals

Question 1 — 2 pts

The measurement 4.7 x 10^{-3} m could also be written as...

- 4.7 nm
- 4.7 Mm
- 4.7 km
- 4.7 mm

Question 2 — 2 pts

The mole concept is important in chemistry because...

- it allows us to count atoms and molecules by weighing macroscopic amounts of material.
- it provides a universally accepted standard for mass.
- it establishes a standard for reaction stoichiometry.
- it allows us to distinguish between elements and compounds.

Question 3 — 2 pts

How many atoms of hydrogen are contained in 2 moles of methane (CH_4)?

- 4.82 x 10^{24} atoms
- 1.20 x 10^{24} atoms
- 2.41 x 10^{24} atoms
- 4 atoms

Question 4 — 2 pts

Which has the greatest number of hydrogen atoms?

- 20g of hydrogen gas
- 10^{22} hydrogen atoms
- 100g of a substance that is 2% H by mass
- 100g of water

Question 5 — 2 pts

Consider the following UNBALANCED chemical equation:

$Ca(OH)_2(aq) + H_3PO_4(aq) \longrightarrow Ca_3(PO_4)_2(s) + H_2O(l)$

What is the coefficient for H_2O when the reaction is balanced using the smallest possible integers?

- 6
- 1
- 2
- 3
- 4

Question 6 — 2 pts

When aluminum metal is heated with manganese oxide, the following reaction occurs:

$Al + MnO_2 \longrightarrow Al_2O_3 + Mn$

Balance this equation. What is the sum of the coefficients of ALL species in the balanced chemical equation?

- 7
- 12
- 10
- 15

Question 7 — 2 pts

When the equation

$PbS + O_2 \longrightarrow PbO + SO_2$

is balanced, the coefficients are _____, respectively.

- 2, 2, 1, 2
- 1, 2, 1, 1
- 1, 2, 3, 3
- 2, 3, 2, 2

Question 8 — 2 pts

Consider the UNBALANCED reaction below.

$Al_2(SO_4)_3 + NaOH \longrightarrow Al(OH)_3 + Na_2SO_4$

Balance this equation using the smallest possible integers. What is the sum of the coefficients in the balanced equation?

- 14
- 6
- 8
- 10
- 12

Question 9 — 2 pts

Which of the following has the greatest number of ATOMS?

- 3.05 moles of argon
- These all have the same number of atoms.
- 3.05 moles of water
- 3.05 moles of CH_4

Question 10 — 2 pts

If 100.0 grams of copper (Cu) completely reacts with 25.0 grams of oxygen, how much copper (II) oxide (CuO) will form from 140.0 grams of copper and excess oxygen? (Note: CuO is the only product of this reaction.)

- 35.00 g
- 210.0 g
- 160.0 g
- 175.0 g

Question 11 — 2 pts

Consider the following reaction:

$4Fe(s) + 3O_2(g) \longrightarrow 2Fe_2O_3(s)$

If 12.50 g of iron (III) oxide (rust) are produced from 8.74 g of iron, how much oxygen gas is needed for this reaction?

- 21.24 g
- 3.76 g
- 7.55 g
- 8.74 g

Question 12 — 2 pts

Upon heating, potassium chlorate produces potassium chloride and oxygen.

$2KClO_3 \longrightarrow 2KCl + 3O_2$

What mass of oxygen would be produced upon thermal decomposition of 25 g of potassium chlorate ($KClO_3$)? The molecular weight (MW) of potassium chlorate is 122.5 g/mol.

- 4.9 g
- 9.8 g
- 6.5 g
- 3.3 g

Question 13 — 2 pts

Consider the following reaction:

$CO + O_2 \longrightarrow CO_2$

How much oxygen is required to convert 35 g of CO into CO_2?

- 20 g
- 35 g
- 10 g
- 40 g

Question 14 — 2 pts

Consider the following reaction:

$N_2 + H_2 \longrightarrow NH_3$

How many MOLECULES of NH_3 can be produced from the reaction of 74.2 g of N_2 and 14.0 moles of H_2?

- 1.26 x 10^{25} molecules
- 3.19 x 10^{24} molecules
- 4.45 x 10^{24} molecules
- 5.62 x 10^{24} molecules

Question 15 — 2 pts

Consider the following reaction:

$C_6H_6 + O_2 \longrightarrow CO_2 + H_2O$

39.7 grams of C_6H_6 are allowed to react with 105.7 g of O_2. How much CO_2 will be produced by this reaction?

- 134.4 g
- 116.3 g
- 145.3 g
- 22.4 g