

1. (4 Pts) Complete the following chart, in order from left to right

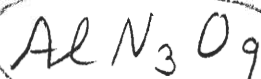
Ion	Mass Number	Protons	Neutrons	Electrons
$^{40}\text{Ca}^{2+}$	40	20	20	18

2. (5 Pts) A sample of unknown ore was analyzed and found to contain 12.7% Al, 19.7% N, and 67.6% O. What is the empirical formula of this ore?

$$\text{Al: } \frac{12.7\text{g/mol}}{27.0\text{g}} = 0.4704 \div 0.4704 = 1$$

$$\text{N: } \frac{19.7\text{g/mol}}{14.01} = 1.406 \div 0.4704 = 3$$

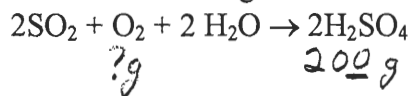
$$\text{O: } \frac{67.1\text{g/mol}}{16.0\text{g}} = 4.225 \div 0.4704 = 9$$



3. (3 Pts) An atom of the isotope
- ^{137}Ba
- consists of how many protons (p), neutrons (n), and electrons (e)?

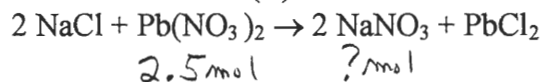
Protons 56 neutrons 81 electrons 56

4. (6 Pts) What is the minimum mass of oxygen gas necessary to produce 200. g of sulfuric acid in the following reaction?



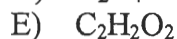
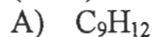
$$\frac{200\text{g H}_2\text{SO}_4}{98.08\text{g}} \times \frac{1\text{mol O}_2}{2\text{mol H}_2\text{SO}_4} \times \frac{32.00\text{g O}_2}{1\text{mol O}_2} = 32.6\text{g O}_2$$

5. (4 Pts) How many moles of sodium nitrate would be produced from the complete reaction of 2.5 moles of lead(II) nitrate?



$$\frac{2.5\text{mol Pb}(\text{NO}_3)_2}{1\text{mol Pb}(\text{NO}_3)_2} \times \frac{2\text{mol NaNO}_3}{1\text{mol Pb}(\text{NO}_3)_2} = 5.0\text{mol NaNO}_3$$

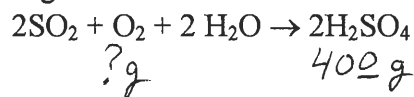
6. (3 Pts) Which of the following is an example of an empirical formula?



1. (3 Pts) An atom of the isotope ^{137}Ba consists of how many protons (p), neutrons (n), and electrons (e)?

Protons 56 neutrons 81 electrons 56

2. (6 Pts) What is the minimum mass of oxygen gas necessary to produce 400. g of sulfuric acid in the following reaction?



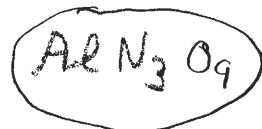
$$\frac{400g \text{ H}_2\text{SO}_4}{98.08g} \times \frac{1 \text{ mol O}_2}{2 \text{ mol H}_2\text{SO}_4} \times 32.00g \text{ O}_2 = \boxed{65.25g \text{ O}_2}$$

3. (5 Pts) A sample of unknown ore was analyzed and found to contain 12.7% Al, 19.7% N, and 67.6% O. What is the empirical formula of this ore?

$$\text{Al: } \frac{12.7g}{27.0g} \text{ mol} = 0.4704 \div 0.4704 = 1$$

$$\text{N: } \frac{19.7g}{14.01g} \text{ mol} = 1.406 \div 0.4704 = 3$$

$$\text{O: } \frac{67.6g}{16.0g} \text{ mol} = 4.225 \div 0.4704 = 9$$



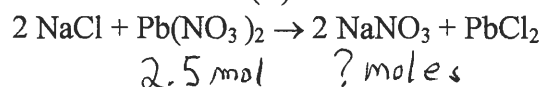
4. (3 Pts) Which of the following is an example of an empirical formula?

- A) C_9H_{12}
 B) $\text{C}_9\text{H}_{18}\text{Cl}_2$
 C) C_6H_6
 D) N_2O_4
 E) $\text{C}_2\text{H}_2\text{O}_2$

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6. (4 Pts) How many moles of sodium nitrate would be produced from the complete reaction of 2.5 moles of lead(II) nitrate?



$$\frac{2.5 \text{ mol Pb}(\text{NO}_3)_2}{1 \text{ mol Pb}(\text{NO}_3)_2} \times \frac{2 \text{ mol NaNO}_3}{1 \text{ mol Pb}(\text{NO}_3)_2} = \boxed{5.0 \text{ mol NaNO}_3}$$