

- (1.) A molecular compound **X** is composed of 56.3% P and 43.7% S. From experiment, the molar mass of **X** is determined as 218 g. (25 points)
- (a) Please determine the empirical and molecular formulae for **X**
 - (b) Please write the balanced equation for the combustion of **X** in the air to produce sulfur dioxide and diphosphorus pentoxide
 - (c) Let's suppose you do the combustion of 1.00 g of **X** with 1.00 g O₂; please determine the limiting reactant
 - (d) Please calculate the theoretical yield of diphosphorus pentoxide in part (c)
 - (e) If the actual yield of diphosphorus pentoxide is 0.98 g, what is the % yield?

- (2.) Please formulate the following compounds: (45 points)

- (a) tin (IV) carbonate
- (b) barium phosphate
- (c) manganese (III) nitrite
- (d) lithium silicide
- (e) plumbic nitrate
- (f) strontium cyanide
- (g) stannic sulfide
- (h) antimony (III) arsenide
- (i) magnesium sulfite
- (j) manganic perchlorate
- (k) iron(III) phosphide
- (l) cupric bicarbonate
- (m) dinitrogen tetroxide
- (n) lead (IV) oxide
- (o) ferrous phosphide

- (3.) Please "match the pairs" by writing the *best* matching letter in the space given, using each letter once only: (10 points)

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| _____ ions | (A) # protons in atom |
| _____ exact numbers | (B) does not form compounds |
| _____ matter | (C) mass of protons and neutrons in atom |
| _____ element # 82 | (D) infinite precision |
| _____ helium | (E) atoms and molecules |
| _____ atomic mass | (F) can form more than one cation |
| _____ no charge | (G) generated by electron-transfer |
| _____ Z | (H) recognized globally as standard |
| _____ molecular compounds | (I) occupies volume, has mass |
| _____ S. I. units | (J) formed from non-metallic elements |

- (4.) Assuming that the quantities on the left of the arrows were all obtained by measurement, please interconvert the units, as designated. Show all work for full credit. (20 points)

- (a) 3.902 ft³ -----> gal (b) - 24.6 °C -----> °F
(c) 6.060 m/s -----> miles/hr (d) 2.69 lb/L -----> kg/ft³

Given Units: 39.37 in = 1 m; 2.54 cm = 1 in; 453.6 g = 1 lb; 1 oz = 28.35 g;
1 gal = 3.785 L; 1 L = 10³ mL; 1 mL = 1 cm³; 12 in = 1 ft; 2.205 lb = 1 kg; 10³ g = 1 kg;
16 oz = 1 lb; 10 mm = 1 cm; 1 km = 0.6215 mile; 1 km = 10³ m; t_F = (9/5)t_C + 32
1 min = 60 s; 1 hr = 60 min