Teacher's Tools® Chemistry
Prerequisites: Moles, Mass and Formulas: Worksheet 2

I did the setup - you do the calculating!

1) What is the mass of 5.33×10^{25} atoms of sodium?

$$5.33 \times 10^{25}\ \text{atoms Na} \left| \frac{1\ \text{mole Na}}{6.022 \times 10^{23}\ \text{atoms Na}} \right| \frac{22.99\ \text{g Na}}{1\ \text{mole Na}}$$

2) How many moles are there in 43.0 grams of aluminum?

$$43.0\ \text{g Al} \left| \frac{1\ \text{mole Al}}{26.98\ \text{g Al}} \right.$$

3) What is the mass of 4.39×10^{-3} moles of hydrogen sulfide?

$$4.39 \times 10^{-3}\ \text{mol } H_2S \left| \frac{34.086\ \text{g } H_2S}{1\ \text{mol } H_2S} \right.$$

4) How many oxygen atoms are there in 2.55 moles of sodium sulfate?

$$2.55\ \text{mol } Na_2SO_4 \left| \frac{6.022 \times 10^{23}\ \text{f.u. } Na_2SO_4}{1\ \text{mol } Na_2SO_4} \right| \frac{4\ \text{O-atoms}}{1\ \text{f.u. } Na_2SO_4}$$

5) What is the mass fraction of carbon in carbon dioxide? CO_2

$$\frac{12.011\ \text{g C}}{44.011\ \text{g } CO_2} = 0.2729, \text{ or } 27.29\%\ \text{C by mass}$$

6) Elemental analysis is performed on a sample of nicotine. Tests show the sample to be 74.0% carbon, 8.65% hydrogen, and 17.4 % nitrogen. What is the empirical formula of nicotine?

$$74.0\ \text{g C} \left| \frac{1\ \text{mol C}}{12.011\ \text{g C}} \right. = \_\_\_\_\ \text{mol C}$$

$$8.65\ \text{g H} \left| \frac{1\ \text{mol H}}{1.008\ \text{g H}} \right. = \_\_\_\_\ \text{mol H}$$

$$17.4\ \text{g N} \left| \frac{1\ \text{mol N}}{14.01\ \text{g N}} \right. = \_\_\_\_\ \text{mol N}$$

} find whole number mole:mole ratio; You may have to divide all by smallest one, and then possibly multiply by same whole # to get whole # ratio

$C_{\square} H_{\square} N_{\square}$

Teacher's Tools® Chemistry
Prerequisites: Nomenclature: Worksheet 3

1. Name each of the following 16 compounds.

a.) H_2SO_4 sulfuric acid
b.) PCl_3 phosphorus trichloride
c.) $NaHCO_3$ sodium bicarbonate
d.) ZnS zinc sulfide
e.) N_2O dinitrogen monoxide
f.) NH_4NO_3 ammonium nitrate
g.) $K_2Cr_2O_7$ potassium dichromate
h.) HBr hydrobromic acid
i.) HIO_4 periodic acid
j.) Cl_2O_7 dichlorine heptoxide
k.) $Pb(OH)_2$ lead (II) hydroxide
l.) Cu_3PO_4 copper (I) phosphate
m.) AgHS silver bisulfide
n.) $Al_2(CO_3)_3$ aluminum carbonate
o.) BaH_2 barium hydride
p.) CrS_3 chromium (VI) sulfide

2. Provide the chemical formula for each of the following 15 compounds.

a.) ammonium hypophosphite $(NH_4)_3PO_2$
b.) lead (II) bromite $Pb(BrO_2)_2$
c.) lead (II) bromide $PbBr_2$
d.) dichlorine monoxide Cl_2O
e.) nickel (II) nitrite $Ni(NO_2)_2$
f.) ammonia NH_3
g.) copper (II) oxide CuO
h.) calcium hypochlorite $Ca(ClO)_2$
i.) barium phosphide Ba_3P_2
j.) strontium sulfate $SrSO_4$
k.) carbon tetrachloride CCl_4
l.) hydrocyanic acid HCN
m.) potassium permanganate $KMnO_4$
n.) hydrofluoric acid HF
o.) zinc arsenate $Zn(AsO_4)_2$ ← Edwin says this is right.

Teacher's Tools® Chemistry
Atomic Structure: Worksheet 1

1. Which of the following combinations of particles represents an ion of net charge -1 and mass number 82?
   (A) 46 neutrons, 35 protons, 36 electrons
   (B) 46 neutrons, 36 protons, 35 electrons
   (C) 46 neutrons, 36 protons, 36 electrons
   (D) 47 neutrons, 35 protons, 35 electrons
   (E) 47 neutrons, 35 protons, 36 electrons

2. One species of element M has an atomic number of 10 and a mass number of 20; one species of element N has an atomic number of 11 and a mass number of 20. Which of the following statements about these two species is true?
   (A) They are isotopes.
   (B) They are isomers.
   (C) They are isoelectronic.
   (D) They contain the same number of neutrons in their atoms.
   (E) They have the same atomic mass.

3. A neutral atom has an atomic number of 30 and a mass number of 62; the atom must contain
   (A) 92 neutrons (B) 62 electrons (C) 29 neutrons (D) 30 electrons

4. Atom X has 12 protons, 12 electrons, and 13 neutrons. Atom Y has 10 protons, 10 electrons, and 15 neutrons. It can therefore be concluded that
   (A) atoms X and Y are isotopes.
   (B) atom X is more massive than atom Y.
   (C) atoms X and Y have the same mass number.
   (D) atoms X and Y have the same atomic number.

5. A neutral atom which has 42 electrons and a mass number of 93 has
   (A) an atomic number of 51.
   (B) a nucleus containing 51 neutrons.
   (C) a nucleus containing 40 neutrons.
   (D) a nucleus containing 51 protons.

Teacher's Tools® Chemistry
Atomic Structure: Worksheet 1

6. A sodium ion, Na^+, contains the same number of electrons as
   (A) a sodium atom, Na.
   (B) a magnesium atom, Mg.
   (C) a potassium ion, K^+.
   (D) a neon atom, Ne.

7. If two atomic species are isotopes, then
   (A) both atoms must have identical nuclei.
   (B) the nuclei of both atoms contain the same number of neutrons.
   (C) the nuclei of both atoms contain the same number of protons.
   (D) both atoms must have the same mass.

8. The partial symbol for a particular ion is $^{26}M^{2+}$. The number of electrons contained in one of these ions is
   (A) 2 (B) 10 (C) 12 (D) 24

9. An atom of iron-56, ^{56}Fe, contains
   (A) 26 electrons, 26 protons, 56 neutrons
   (B) 56 electrons, 26 protons, 26 neutrons
   (C) 56 electrons, 56 protons, 26 neutrons
   (D) 26 electrons, 26 protons, 30 neutrons

10. $^{20}_{40}Ca$, $^{19}_{39}K$, and $^{22}_{42}Ti$ all have the same
    (A) number of electrons.
    (B) atomic number.
    (C) mass number.
    (D) number of neutrons.

11. The charge on the nucleus of a Mg^{2+} ion is
    (A) +2
    (B) +10
    (C) +12 # of protons in nucleus
    (D) -2

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