1- Choose the INCORRECT oxidation state.

A) CN^-, C: +2   B) H_2SO_4, S: +6   C) ClF_3, Cl: +3

D) H_2O_2, O: -2   E) Hg_2F_2, Hg: +1

2- In which of the following pairs is the oxidation number for the underlined element INCORRECT?

A) $\underline{N}H_4^+$ /-3   **B)** $\underline{Mn}O_4^-$ /7   **C)** $\underline{Cr}_2O_7^{2-}$ /6   **D)** $\underline{S}O_4^{2-}$ /4   **E)** $\underline{N}O_3^-$ /5

3- Choose the INCORRECT oxidation state.

A) H_2SO_4, S: +6   **B)** H_2O_2, O: -2   **C)** NH_4^+, N: -3

D) MnO_2, Mn: +4   **E)** $Cr_2O_7^{2-}$, Cr: +6

4- Which sample represents the greatest number of moles? (C: 12 g/mol, H: 1 g/mol, O: 16 g/mol, N: 14 g/mol)

A) 30 g ethane gases (C_2H_6)

B) 1.0 moles of benzene

C) 6.022×10^{23} molecules of propane

D) 90 g acetic acid (CH_3COOH)

E) 180000 mg aspirin ($C_9H_8O_4$)

5- The molecular formula for nicotine is $C_{10}H_{14}N_2$. How many moles of C atoms are present in a 3.0 g sample of nicotine? (C: 12 g/mole, H: 1 g/mole, O: 16 g/mole)

A) 0.370 mole   **B)** 0.041 mole   **C)** 0.185 mole   **D)** 0.275 mole   **E)** 0.018 mole

6- How many hydrogen atoms are present in 25,6 g of urea, [$(NH_2)_2CO$], which is used as a fertilizer? (H: 1 g/mole, N: 14 g/mole, C: 12 g/mole, O: 16 g/mole)

A) $6{,}02 \cdot 10^{23}$ B) $2{,}57 \cdot 10^{23}$ C) $1{,}03 \cdot 10^{24}$ D) $5{,}13 \cdot 10^{23}$ E) $1{,}34 \cdot 10^{24}$

7- The molecular formula for paracetamol is $C_8H_9NO_2$. How many moles of C atoms are present in a 10.0 g sample of paracetamol? (C: 12 g/mol, H: 1 g/mol, O: 16 g/mol, N: 14 g/mol)

A) 0.066 mol   B) 0.132 mol   C) 0.53 mol   D) 0.27 mol   E) 0.010 mol

8- The chief component of clove oil is X, which contains 40.7% carbon, 54.2% oxygen, and 5.1% hydrogen? (C: 12 g/mol, H: 1 g/mol, O: 16 g/mol)

What is the empirical formula of X?

A) CH_3O_2 B) C_2H_6O C) $C_5H_9O_5$ D) $C_2H_3O_2$ E) $C_4H_3O_2$

9- When 3.606 grams of organic compound is burned, 5.28 g of CO_2, 3.846 g of SO_2 and 2.16 g of H_2O are formed. What is the empirical formula of this compound? (C:12 g/mol, H:1 g/mol, O:16 g/mol, S:32 g/mol)

A) C_2SH_2 **B)** $C_2SO_8H_2$ **C)** $C_2S_2O_4H_4$ **D)** C_2SH_4 **E)** CSH

10- A 4.05 g sample of a compound containing only C, H, and O was burned completely. The only combustion products were 10.942 g CO_2 and 4.476 g H_2O. What is the empirical formula of the compound? (C: 12 g/mole, H: 1 g/mole, O: 16 g/mole)

A) $C_7H_{14}O$ **B)** $C_7H_{14}O_7$ **C)** $C_6H_{12}O$ **D)** C_7H_7O **E)** CH_2O

11- Which of the following numbers has 4 significant figures?

A) 0.00130 g   B) 100 g   C) 0.1001 g   D) 9.99 g   E) 0.0909 g

12-   2.8 x 4.5039 =? what is the result of the operation expressed in significant numbers?

A) 12.6   B) 12.61092   C) 12.611   D) 13   E) 12

13-   2.80 x 4.5039 =? what is the result of the operation expressed in significant numbers?

A) 12.6   B) 12.61092   C) 12.611   D) 13   E) 12

14- An atom has 15 neutrons, 18 protons and 19 electrons. What is the correct representation for this atom?

A) $^{33}_{18}X^-$ B) $^{33}_{18}X^+$ C) $^{33}_{15}X^-$ D) $^{33}_{15}X^+$ E) $^{37}_{15}X^-$

15- An atom has 15 neutrons, 18 protons and 17 electrons. What is the correct representation for this atom?

A) $^{33}_{18}X^-$ B) $^{33}_{18}X^+$ C) $^{33}_{15}X^-$ D) $^{33}_{15}X^+$ E) $^{37}_{15}X^-$

16- An atom has 18 neutrons, 15 protons and 16 electrons. What is the correct representation for this atom?

A) $^{33}_{18}X^-$ B) $^{33}_{18}X^+$ C) $^{33}_{15}X^-$ D) $^{33}_{15}X^+$ E) $^{37}_{15}X^-$

17- If the density of indium is 7.31 g/cm³, how many atoms are there in a indium piece of 30 dm wide, 5 cm long and 1.6 mm thick? (In: 114.8 g/mol, N_A=6,02x10²³)
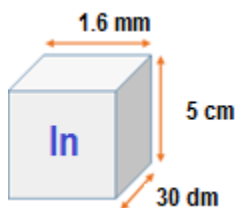
A) 9,19 x 10²⁴ B) 9,19 x 10²² C) 15,3 x 10²³ D) 15,3 x10²² E) 918 x 10²

18- If the density of lead is 11.34 g/cm³, how many atoms are there in a lead piece of 2.5 cm wide, 1.00 m long and 2.1 mm thick? (Pb: 207 g/mol, N_A=6,02x10²³)

**A)** 1.73x10²³ **B)** 1.73x10²⁴ **C)** 1.03x10²⁴ **D)** 1.03x10²³ **E)** 6.03x10²³

19- A physical property is;

A) The ability of a sample to undergo change

B) A property the sample displays that result in a change in composition

C) A substance comprised of a single type of atom

D) A property the sample displays without changing composition.

E) A characteristic of a material that can only be observed with chemical decomposition.

20- 15.875 g Cu are combined with 126 g of HNO_3 according to the reaction:

$$3\ Cu + 8\ HNO_3 \rightarrow 3\ Cu(NO_3)_2 + 2\ NO + 4\ H_2O.$$
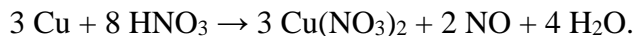
Which reagent is limiting and how many grams of $Cu(NO_3)_2$ are produced? (Cu: 63.5 g/mol, H: 1 g/mol, O: 16 g/mol, N: 14 g/mol)

A) Cu, 187.5 g

B) $Cu(NO_3)_2$, 46.875 g

C) HNO_3, 93.8 g

D) HNO_3, 125.65 g

E) Cu, 46.875 g

21- What is the limiting reagent compound when the each 500 g samples from PCl_3, Cl_2 and P_4O_{10} are reacted, and how much $POCl_3$ is formed at most?

$$PCl_3\ +\ Cl_2\ +\ P_4O_{10}\ \rightarrow\ POCl_3\ \text{(The reaction equation is not balanced)}$$

A) PCl_3; 931 g $POCl_3$ **B)** Cl_2; 1031 g $POCl_3$ **C)** PCl_3; 301 g $POCl_3$

D) P_4O_{10}; 813 g $POCl_3$ **E)** PCl_3; 5403 g $POCl_3$

22- $Ca(OH)_{2(k)} + NH_4Cl_{(k)} \rightarrow CaCl_2(aq) + NH_3(g) + H_2O(s)$ (Reaction is not balanced)
If a mixture containing 33 g each of NH_4Cl and $Ca(OH)_2$ is heated, how many grams of NH_3 will form and which reactant remains in excess, and in what mass? (Ca: 40 g/mol, Cl: 35,5 g/mole, O: 16 g/mole, N: 14 g/mole, H: 1 g/mole)
A) 32,93 g NH_3 ve 9,14 g NH_4Cl B) 7,58 g NH_3 ve 22,9 g $Ca(OH)_2$
C) 32,93 g NH_3 ve 23,85 g NH_4Cl D) 7,58 g NH_3 ve 25,42 g $Ca(OH)_2$
E) 10,5 g NH_3 ve 10,1 g $Ca(OH)_2$

23- The label on a pressurized can of spray disinfectant warns against heating the can above 68 °F. What are the corresponding temperatures on the Celsius and Kelvin temperature scales?

A) 22.5 °C, 295.65 K

B) 20 °C, 293.15 K

C)25 °C, 298.15 K

D) 68 °C, 341.15 K

E) 28 °C, 301.15 K

24- The label on a pressurized can of spray disinfectant warns against heating the can above 122 °F. What are the corresponding temperatures on the Celsius and Kelvin temperature scales?

A) 82.5 °C, 355.65 K

B) 85 °C, 358.15 K

C) 80 °C, 353.15 K

D) 50 °C, 323.15 K

E) 93.5 °C, 366.65 K

25- The label on a pressurized can of spray disinfectant warns against heating the can above 194 °F. What are the corresponding temperatures on the Celsius and Kelvin temperature scales?

A) 82.5 °C, 355.65 K

B) 85 °C, 358.15 K

C) 80 °C, 353.15 K

D) 90 °C, 363.15 K

E) 93.5 °C, 366.65 K