

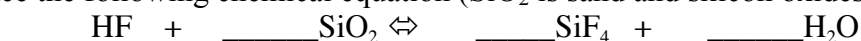
Numerical constants may be listed below. Other needed information is given in the problem or written on the board or found in the periodic tables you will use during exam. For numerical problems, be sure to **show your work**, include units and circle your final answer. If several choices are given, **circle the correct answer**. Your written answers should be brief and to the point. You can use your own calculator on the exam, but no notes, books, external information, or other electronic devices are to be used. No cell phone is to be used in Exam room.

$$1.00 \text{ g} = 6.022 \times 10^{23} \text{ amu} \quad 1 \text{ mol} = 6.022 \times 10^{23} \quad \text{K} = ^\circ\text{C} + 273 \quad ^\circ\text{C} = (^\circ\text{F} - 32) / 1.8$$


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Consider the following statement prior to answering the six questions dealing with aspects of hydrogen fluoride or hydrofluoric acid. Spilling 70% HF over 2% of the body area will very easily result in death- the acid destroys tissue, decalcifies bone, and poisons the nervous system. Spills as small as 100mL have resulted in death... the small molecular size of the acid makes it penetrate skin and fat very quickly, and once it is in the blood it will act as a poison. The high concentration acid also outgases pure HF extensively, and inhalation of as much as a single lungfull of that gas will result in almost certain death by pulmonary edema. To make things worst, HF can also eat through most gloves. Although very dangerous, HF acid finds a variety of uses in Industry, from the vital etching of semiconductors to make microchips to chemical analysis for SiO<sub>2</sub> to frosting glass, cleaning metals..." [www.powerlabs.org/chemlabs/hydrofluo.htm](http://www.powerlabs.org/chemlabs/hydrofluo.htm)

1) Balance the following chemical equation (SiO<sub>2</sub> is sand and silicon oxides are found in glass)



2) Name the following



3) Identify the number of neutrons, and electrons in the negative ion <sup>19</sup>F<sup>-</sup>

#n =

#e =

4) To make 250 mL of 5.00M HF(aq) would require diluting how many mL of 11.00M HF(aq)?

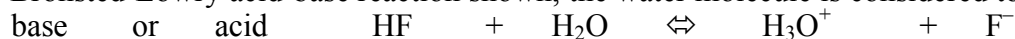
5) Consider the following and circle which form would be present in the greatest amount in a water solution

HF (unionized)

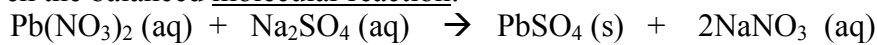
or

H<sup>+</sup> and F<sup>-</sup> (ionized)

6) For the Bronsted-Lowry acid-base reaction shown, the water molecule is considered to act as



7) Given the balanced molecular reaction:



write the net ionic reaction (leave out spectator ions)

8) If solutions of  $\text{Na}_2\text{S}(\text{aq})$  and  $2\text{HCl}(\text{aq})$  are mixed together, hydrogen sulfide gas is formed and some ions are left in solution. Complete the balanced molecular equation for this reaction

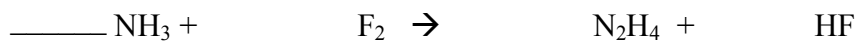


9) More than a million people a year in the US are hospitalized with kidney stone attacks. The buildup of calcium ions and oxalate ions ( $\text{C}_2\text{O}_4^{2-}$ ) to excessive amounts can cause formation of precipitates of calcium oxalate (one of the types of kidney stones). If too large, these stones can become lodged in the urinary tract causing extreme pain. Write the net ionic reaction for the formation of calcium oxalate

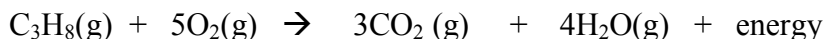
10) Consider the following and circle which form would be present in the greatest amount in a water solution



11) Balance the following chemical equation



12) In the animated TV series “King of the Hill” Hank Hill works at Strickland Propane Company. In fact, propane is a hydrocarbon fuel used in outdoor grills for cooking and is combined with oxygen as shown in the balanced chemical equation



Using the above reaction, 200 grams of  $\text{C}_3\text{H}_8$  could produce how many grams of  $\text{H}_2\text{O}$ ?

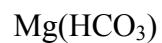
13) Using the equation  $\text{C}_3\text{H}_8(\text{g}) + 5\text{O}_2(\text{g}) \rightarrow 3\text{CO}_2(\text{g}) + 4\text{H}_2\text{O}(\text{g}) + \text{heat}$  If you had 44.0g of  $\text{C}_3\text{H}_8$  and 64.0g of  $\text{O}_2$  which one is the limiting reactant that will be used up first in the combustion reaction. Show work below.

14) A sample of butanoic acid is found to contain by weight 54.5% C, 9.1% H, and 36.4% O, therefore the empirical formula is

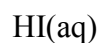
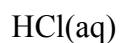
15) The empirical formula of diborane is  $\text{BH}_3$ . If the molecular weight is 27.62 then what is the molecular formula for diborane

16) 100. g of  $\text{PbSO}_4(\text{s})$  contains how many  $\text{Pb}^{2+}$  ions (give the number of ions, not just moles)

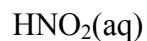
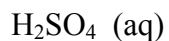
17) Name the following compounds



18) Name the following binary acids



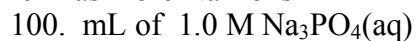
19) Name each of the following oxo-acids



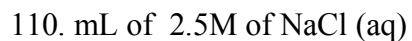
20) If 330g of  $\text{NH}_3$  are expected to be formed in a chemical reaction but only 220g are actually formed then what is the percent yield of ammonia?

21) A 100mL solution of 2.00M  $\text{MgSO}_4(\text{aq})$  contains how many moles of  $\text{Mg}^{2+}$  ions

22) Which has more  $\text{Na}^+$  ions



or



23) To make 0.500L of a 0.250M solution of sodium hydroxide requires using a balance to find what mass of sodium hydroxide?