G10 Science: Class 3 Homework

1. Complete the following table. **[8 marks]**

Chemical Formula	Acid or Base?	Chemical Name
KOH (aq)		
HNO_3 (aq)		
$Ba(OH)_2$ (aq)		
$KHCO_3$ (aq)		
H_2SO_4 (aq)		
LiOH (aq)		
H_2S (aq)		
H_3PO_4 (aq)		

2. Classify the following solutions as highly acidic, slightly acidic, neutral, slightly basic, or highly basic: **[4 marks]**

   a) A solution with a pH of 13 _____

   b) A solution with a pH of 6 _____

   c) A solution with a pH of 1 _____

   d) The moisture on your skin _____

3. Arrange the following list of substances from most basic to most acidic. **[2 marks]**

   Baking soda, tomatoes, stomach, acid, bleach, black coffee, pure water

4. Consider these seven compounds: $H_3PO_4(aq)$, HBr(aq), $Fe(OH)_3$, $H_2SO_4(aq)$, $Ca(HCO_3)_2$ and KNO_3. Predict which of these compounds will produce a solution with a pH: **[6 marks]**

   a) Less than 7 _____

   b) Greater than 7 _____

   c) Equal to 7 _____

5. People who suffer from bulimia sometimes self-induce vomiting to prevent weight gain. Consider the properties of the chemical in your stomach. Why do the teeth of people with bulimia often appear worn or eroded? **[2 marks]**

6. A pink mixture of sodium hydroxide and phenolphthalein indicator was injected into a lemon. The lemon was cut in half. Explain why the inside of the lemon was not pink. **[2 marks]**

7. Three unlabelled bottles containing solutions were found in the chemical storeroom. The labels had fallen off the bottles and were found on the shelf. The solutions contained hydrochloric acid, sodium chloride, and sugar. A series of tests was carried out to identify the chemicals. Identify the three solutions using the results below: **[3 marks]**

Solution	Colour with bromothymol blue	Reaction with magnesium	Electrical conductivity
A	Blue to yellow	Bubbles	High
B	Remains blue	No reaction	High
C	Remains blue	No reaction	None

Solution A
_____

Solution B
_____

Solution C
_____

8. The following chemical equation represents the combustion of propane in a sealed container:

$$C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(g)$$

Use the data below to determine the mass of oxygen consumed in the reaction. Show all work. **[3 marks]**

Item	Mass (g)
Container only	50.0
Propane and container	61.8
Carbon dioxide, water, and container	104.8

9. Predict the products and balance the following neutralization reactions: **[10 marks]**

a) $HI\ (aq) + NaOH(aq)$

b) $HBr(aq) + Ba(OH)_2\ (aq)$

c) $H_3PO_4(aq) + Ca(OH)_2\ (aq)$

d) $HNO_3(aq) + Al(OH)_3$

e) $HCl(aq) + Mg(OH)_2\ (aq)$

10. The hard parts of coral and shellfish are mostly made up of calcium carbonate. Evidence suggests that air pollution is causing the oceans to become slightly acidic.

    a) What kind of chemical reaction occurs when acids are in contact with calcium carbonate? **[1 mark]**

    b) Write the balanced chemical equation for the reaction of sulfuric acid with calcium carbonate. **[2 marks]**

    c) What effect would this reaction have on coral ecosystems? Explain. **[2 marks]**

11. You test the pH of your pool and find that the pH is 8.2.

    a) Is the pool water acidic or basic? **[1 mark]**

    b) At this pH, how is the water quality affected? **[1 mark]**

    c) How could you adjust the pH of your pool to be in the acceptable range? **[1 mark]**

12. Consider two neighbouring lakes in an isolated region of Ontario. One lake is on limestone ($CaCO_3$) while the other is on granite. Both receive the same amount of acid precipitation.

    a) Explain why the limestone lake has a higher pH than the granite lake. **[2 marks]**

    b) Which lake is likely to have a healthier aquatic ecosystem? Explain your answer. **[2 marks]**