Acid / Base I Review

1. Complete the following table (assume 25°C)

	$[H^+]$	pH	pOH	$[OH^-]$	Solution (acidic, basic, or neutral)
a.	3.0×10^{-2}				
b.			6.66		
c.		11.72			
d.				1.7×10^{-6}	
e.	8.0×10^{-5}				
f.					neutral
g.		3.00			
h.			15.0		
i.				8.7×10^{-3}	
j.		5.58			

2. A sample of monkey blood was tested and found to have a pH of 7.43. Calculate $[H^+]$ and $[OH^-]$.

3. Calculate the pH and pOH of
   a) 2.0M HCl solution b) .00035M NaOH solution c) 0.20M H_2SO_4 solution
   d) 1.25×10^{-6} M $Sr(OH)_2$ solution

4. Calculate the mass of NaOH which is required to neutralize 25.00mL of 0.500M H_2SO_4.

5. A chemist pipettes 25.00mL of 0.15M HCl into a 100.0mL volumetric flask. Then she adds water to the mark. Calculate the pH of this solution.

6. Consider the following equilibrium:
   $H_2S_{(aq)} + HTe^-_{(aq)} \Leftrightarrow HS^-_{(aq)} + H_2Te_{(aq)}$
   The reactants are favoured in this equilibrium.
   a) Identify the stronger acid.
   b) Identify the weaker base.

7. Using HCO_3^- as an example of a base, write an equation showing how conjugate acid-base pairs are related to each other. Identify an acid-base pair in the equation.

8. a) Define the term "conjugate base".
   b) Give an example of a conjugate acid-base pair.

9. Calculate the volume of 0.050M KOH required to neutralize 250mL of 0.35M HNO_3.

10. Tomato juice has a pH of 4.20. Calculate the $[H_3O^+]$ and $[OH^-]$ in tomato juice.

11. Calculate the pH of a solution prepared by adding 60.0mL of 0.150M HCl to 140.0mL of 0.100M KOH.

12. a) Define the term "amphiprotic".
b) Give an example of an amphiprotic substance.

13. a) A solution of NaOH is standardized using pure oxalic acid, $H_2C_2O_4$. Write the balanced formula equation (neutralization) for this reaction.
b) In a titration, 60.00mL of NaOH are required to neutralize a 1.00g sample of oxalic acid. Calculate the [NaOH].

14. At 60°C, the pH of water is 6.51. Calculate K_w at this temperature.

15. Tartaric acid, $H_2C_4H_4O_6$, is the diprotic acid found in many wines. In an experiment, 10.00mL samples of wine were titrated with 0.104M NaOH. The following data were recorded.

Trial	Volume of NaOH added
1	11.33mL
2	11.55mL
3	11.31mL

From this data, calcuate the percent by mass of tartaric acid in the wine tested. Assume the density of wine to be 1.0g/mL.

16. An ammeter is used to determine electrical conductivity of the following solutions:
I. 25mL of 1.0M acetic acid
II. 25mL of 1.0M hydrocyanic acid
III. 25mL of 1.0M hydrobromic acid
Rank conductivity from greatest to least. Explain your choices.

17. Consider the reaction between 0.1M solutions of ammonium bromide and potassium hydrogen carbonate.
a) Write the formula equation.
b) Write the conjugate acid-base equation.
c) Identify whether the products or reactants are favoured in the net ionic equation. Explain.

18. A student spills a small amount of HCl into an aquarium containing 140L of water, dropping the pH from 6.80 to 4.50. What mass of $Ca(OH)_2$ would be required to raise the pH back to 6.80? *HINT: perform calcs. with *dominant* species.

19. Explain why H_3O^+ is the strongest acid which can exist in water. Relevant equations may be used to support your answer.

20. At 10°C, $K_w = 2.95 \times 10^{-15}$.
    a) Determine the pH of water at 10°C.
    b) State whether water at this temperature is acidic, basic, or neutral, and explain.

21. An acid-base reaction occurs between HSO_3^- and IO_3^-.
    a) Write the equation for the equilibrium that results.
    b) Identify one conjugate acid-base pair in the reaction.
    c) State whether reactants or products are favoured, and explain how you arrived at your answer.

22. a) Write the dissociation reaction for water (including 'energy' on the proper side of the equation).
    b) Write the K_w equation.
    c) What is the K_w and pK_w at 25°C?
    d) If the temperature of water is increased, what happens to the K_w value?

23. What is the approximate pH range of a) blood b) rainwater c) household cleaning products d) battery acid e) coffee

24. Define the following terms:
    a) Arrhenius Acid
    b) Arrhenius Base
    c) Bronsted-Lowry Acid
    d) Bronsted-Lowry Base

25. Write balanced equations showing water acting as an acid with CO_3^{2-}, then water acting as a base with $Al(H_2O)_6^{3+}$.

26. Present two lab tests, and how their outcomes could be used to distinguish between a strong acid and a weak acid of equal molar concentrations.

***** Don't forget to do Cl^- titration questions p.101-102 # 70-72, 74-75…they will be quizzed/tested in the Acid/Base unit due to the fact that we first learn about titrations in that unit…**