**Acids and Bases – Homework 1**

1. State whether the following species can behave as an acid, as a base, or both:
2. NH4+
3. NH3
4. H3O+
5. HClO4
6. CO32-
7. NO3-
8. CH3CH2OH
9. CH3COOH
10. HSO4-
11. HNO3
12. HCl
13. In each of the following reactants, one of the reactants acts as an acid. Identify it:
14. H2O(l) + NH3(aq) == NH4+(aq) + OH-(aq)
15. CH3COOH(aq) + HClO4(aq) == CH3COOH2+(aq) + ClO4-(aq)
16. HCO3-(aq) + HSO4-(aq) == H2O(l) + CO2(g) + SO42-(aq)
17. H3O+(aq) + OH-(aq) == 2H2O(l)
18. Identify the acid-base conjugate pairs in the following reactions:
19. HCO3-(aq) + H2O(l) == CO32-(aq) + H3O+(aq)
20. HCO3-(aq) + H3O+(aq) == CO2(g) + H2O(l) + H2O(l)
21. H2SO4(aq) + HNO3(aq) == HSO4-(aq) + NO2+(aq) + H2O(l)
22. HSO4-(aq) + OH-(aq) == SO42-(aq) + H2O(l)
23. Calculate the pH of the following solutions:
24. 0.001 moldm-3 HCl
25. 0.002 moldm-3 KOH
26. 0.10 moldm-3 C6H5COOH (Ka of benzoic acid = 6.3 x 10-5 moldm-3)
27. 0.30 moldm-3 NH4Br (Ka of NH4+ = 5.6 x 10-10 moldm-3)
28. 0.05 moldm-3 NaHSO4 (Ka of HSO4- = 1.0 x 10-2 moldm-3)
29. 0.02 moldm-3 Ba(OH)2.
30. Calculate the molarity of the following solutions:
31. HCl , pH = 3.
32. HCOOH (Ka = 1.6 x 10-4 moldm-3), pH = 3.
33. NaOH, pH = 11.
34. The pH of a 0.10 moldm-3 solution of a weak monoprotic acid, HA is 2.85. Determine the Ka of the acid
35. A 500 cm3 solution containing 1.9g of a weak acid HA has a pH of 3.5. Calculate the molar mass of the acid, given that it has a Ka of 2.0 x 10-6 moldm-3.

………….. Out of 42 ( Grade )