Chemistry 12

Strengths of Acids and Bases Worksheet

Name: Key
Date:
Block:

1. For the following, determine which species would have the **higher** $[H_3O^+]$ in water:

a) 10.0 M $HClO_4$ or 1.0 M $HClO_4$

b) 10.0 M $HClO_4$ or 10.0 M HNO_2

c) 1.0 M HIO_3 or 1.0 M H_2SO_3

d) 1.0 M NH_4^+ or 1.0 M HF

2. Which is the stronger acid?

a) HSO_3^- or HC_2O_4

b) HSO_3^- or HSO_4^-

c) HPO_4^{2-} or HSO_3^-

3. Which is the stronger base?

a) HPO_4^{2-} or HSO_3^-

b) HSO_3^- or HSO_4^-

c) HCO_3^- or $HCOO^-$?

4. Classify each of the following as: a strong acid (SA), weak acid (WA), strong base (SB), weak base (WB) or a spectator ion (S).

a)	F^-	WB	f)	Cl^-	S
b)	HIO_3	WA	g)	NH_3	WB
c)	NO_3^-	S	h)	O^{2-}	SB
d)	$HClO_4$	SA	i)	CH_3COOH	WA
e)	$C_2O_4^{2-}$	WB	j)	ClO_4^-	S

5. What is the $[H_3O^+]$ in a solution made by adding 0.020 moles of nitric acid to 500.mL of water?

$[HNO_3] = \frac{0.020 mol}{0.500 L} = 0.040 M$

$HNO_3 \rightarrow H^+ + NO_3^-$

0.040M 0.040M

6. For the following combinations, determine which species will donate a proton:

a) HSO_3^- and $HC_2O_4^-$

b) HSO_4^- and $HC_6H_5O_7^{2-}$

c) HSO_3^- and $HC_6H_5O_7^{2-}$

7. For the following combinations, determine which species will accept a proton:

a) HCO_3^- and $HC_2O_4^-$

b) HS^- and NO_2^-

c) H_2SO_4 and HPO_4^{2-}

8. a) Write the balanced equation which describes the equilibrium present when 0.1 M H_2SO_3 is mixed with 0.1 M NO_2^- .

$H_2SO_3 + NO_2^- \rightleftharpoons HSO_3^- + HNO_2$

b) For this reaction, equilibrium tends to favour the (*reactants/products*) and the value of K_{eq} is (*<1, >1 or about =1*)

9. a) Write the balanced equation which describes the equilibrium present when 0.1 M HSO_3^- is mixed with 0.1 M $HC_2O_4^-$.

$HSO_3^- + HC_2O_4^- \rightleftharpoons H_2SO_3 + C_2O_4^{2-}$

b) For this reaction, equilibrium tends to favour the (*reactants/products*) and the value of K_{eq} is (*<1, >1 or about =1*)

10. a) Write the balanced equation which describes the equilibrium present when 0.1 M HPO_4^{2-} is mixed with 0.1 M $H_2C_6H_5O_7^-$.

$HPO_4^{2-} + H_2C_6H_5O_7^- \rightleftharpoons H_2PO_4^- + HC_6H_5O_7^{2-}$

b) For this reaction, equilibrium tends to favour the (*reactants/products*) and the value of K_{eq} is (*<1, >1 or about =1*)

11. The K_{eq} for the reaction: $HA_2B + CD^- \rightleftharpoons HCD + A_2B^-$ is **0.0020**

(A) (B) (A) (B)

a) Which is the stronger conjugate acid in the above equilibrium?

HCD

b) Which is the stronger conjugate base in the above equilibrium?

A_2B^-

12. The K_{eq} for the reaction: $H_2X + YZ^- \rightleftharpoons HYZ + HX^-$ is **3.4×10^5**

(A) (B) (A) (B)

a) Which is the stronger conjugate acid in the above equilibrium?

H_2X

b) Which is the stronger conjugate base in the above equilibrium?

YZ^-

13. Equilibrium always favours the (*stronger/weaker*) _____acid

14. Equilibrium always favours the (*stronger/weaker*) _____base