Acid/Base II Multiple Choice Provincial Practice

1.

What is the $[H_3O^+]$ in 0.70M HCN ?

A. 0.70M

B. 1.9×10^{-5} M

C. 1.0×10^{-7} M

D. 3.4×10^{-10} M

A. 1
B. 2
C. 3
D. 4

2.

What is the value of K_b for $H_2PO_4^-$?

A. 1.3×10^{-12}

B. 6.2×10^{-8}

C. 1.6×10^{-7}

D. 7.5×10^{-3}

A. 1
B. 2
C. 3
D. 4

3.

What is the mass of NaOH required to prepare 100.0 mL of NaOH(aq) that has a pH = 13.62 ?

A. 0.38 g

B. 0.42 g

C. 1.67 g

D. 2.40×10^{-14} g

A. 1
B. 2
C. 3
D. 4

4.

The S^{2-} ion is a relatively strong base with an equilibrium constant of 7.7×10^{-1}. What is the K_a value for HS^- ?

A. 1.3×10^{-14}
B. 9.1×10^{-8}
C. 1.1×10^{-7}
D. 7.7×10^{13}

A. 1
B. 2
C. 3
D. 4

5.

Which of the following hypothetical acids would have the lowest conductivity?

	Acid	K_a
A.	0.5M HY	1.0×10^{-1}
B.	1.0M HA	1.0×10^{-6}
C.	1.0M H_2B	1.0×10^{-2}
D.	2.0M HX	1.0×10^{-3}

A. 1
B. 2
C. 3
D. 4

6.

What is the approximate pH of a 0.1M solution of the salt NH_4Cl?

A. 1.0
B. 5.0
C. 7.0
D. 9.0

A. 1
B. 2
C. 3
D. 4

7.

Which of the following is true as a result of the predominant hydrolysis of $NaHCO_3$?

	Solution	Reason
A.	basic	$K_a > K_b$
B.	basic	$K_b > K_a$
C.	acidic	$K_a > K_b$
D.	acidic	$K_b > K_a$

A. 1
B. 2
C. 3
D. 4

8.

A salt forms in the reaction between HF(aq) and NaOH(aq). What is the net ionic equation for the hydrolysis of this salt?

A. $NaF(aq) \rightleftarrows Na^+(aq) + F^-(aq)$

B. $HF(aq) + H_2O(\ell) \rightleftarrows H_3O^+(aq) + F^-(aq)$

C. $F^-(aq) + H_2O(\ell) \rightleftarrows HF(aq) + OH^-(aq)$

D. $HF(aq) + NaOH(aq) \rightleftarrows NaF(aq) + H_2O(\ell)$

A. 1
B. 2
C. 3
D. 4

9.

One of the products of the reaction between $HCl(aq)$ and $NH_4OH(aq)$ undergoes hydrolysis. What is the net ionic equation for this hydrolysis reaction?

A. $NH_4Cl(aq) \rightarrow NH_4^+(aq) + Cl^-(aq)$

B. $Cl^-(aq) + H_2O(\ell) \rightarrow HCl(aq) + OH^-(aq)$

C. $NH_4^+(aq) + H_2O(\ell) \rightleftarrows H_3O^+(aq) + NH_3(aq)$

D. $HCl(aq) + NH_4OH(aq) \rightleftarrows NH_4Cl(aq) + H_2O(\ell)$

A. 1
B. 2
C. 3
D. 4

10.

Which of the following is a basic salt solution?

A. $NH_3(aq)$

B. $NH_4I(aq)$

C. $KNO_3(aq)$

D. $Na_2CO_3(aq)$

A. 1
B. 2
C. 3
D. 4

11.

What term is used to describe the point at which a chemical indicator changes colour?

A. titration point
B. transition point
C. equivalence point
D. stoichiometric point

A. 1
B. 2
C. 3
D. 4

12.

Consider the following indicator equilibrium:

$$\underset{\text{colourless}}{HIn(aq)} + H_2O(\ell) \rightleftarrows H_3O^+(aq) + \underset{\text{blue}}{In^-(aq)}$$

What is the effect of adding HCl to a blue sample of this indicator?

	Equilibrium Shift	Colour Change
A.	left	less blue
B.	left	more blue
C.	right	less blue
D.	right	more blue

A. 1
B. 2
C. 3
D. 4

13.

An indicator has a $K_a = 4 \times 10^{-6}$. Which of the following is true for this indicator?

	pH at Transition Point	Indicator
A.	4.0	methyl orange
B.	4.0	bromcresol green
C.	5.4	methyl red
D.	5.4	bromcresol green

A. 1
B. 2
C. 3
D. 4

14.

A solution was tested with two indicators and the following results were obtained:

Indicator	Colour
methyl red	yellow
thymol blue	yellow

The approximate pH of the solution is

A. 5.2
B. 6.0
C. 9.4
D. 10.6

A. 1
B. 2
C. 3
D. 4

15.

An indicator changes colour in the pH range of 6.40 – 7.20.

What is the K_a for this indicator?

A. 4.0×10^{-7}

B. 1.6×10^{-7}

C. 0.80

D. 6.80

A. 1
B. 2
C. 3
D. 4

16.

What is the net ionic equation for the reaction of nitric acid with $NaOH(aq)$?

A. $H^+(aq) + OH^-(aq) \rightarrow H_2O(\ell)$

B. $HNO_3(aq) + NaOH(aq) \rightarrow NaNO_3(aq) + H_2O(\ell)$

C. $HNO_3(aq) + NaOH(aq) + H_2O(\ell) \rightarrow NaNO_3(aq) + H_3O^+(aq) + OH^-(aq)$

D. $H^+(aq) + NO_3^-(aq) + Na^+(aq) + OH^-(aq) \rightarrow Na^+(aq) + NO_3^-(aq) + H_2O(\ell)$

A. 1
B. 2
C. 3
D. 4

17.

Which of the following is the net ionic equation for the titration reaction of $NH_3(aq)$ with $HCl(aq)$?

A. $H^+(aq) + OH^-(aq) \rightarrow H_2O(\ell)$

B. $NH_3(aq) + H^+(aq) \rightarrow NH_4^+(aq)$

C. $NH_3(aq) + HCl(aq) \rightarrow NH_4Cl(aq)$

D. $NH_3(aq) + H^+(aq) + Cl^-(aq) \rightarrow NH_4^+(aq) + Cl^-(aq)$

A. 1
B. 2
C. 3
D. 4

18.

What is the net ionic equation that describes the reaction of $HCl(aq)$ with $Pb(OH)_2(s)$?

A. $H^+(aq) + OH^-(aq) \rightarrow H_2O(\ell)$

B. $2HCl(aq) + Pb(OH)_2(s) \rightarrow PbCl_2(s) + 2H_2O(\ell)$

C. $2H^+(aq) + 2Cl^-(aq) + Pb(OH)_2(s) \rightarrow PbCl_2(s) + 2H_2O(\ell)$

D. $2H^+(aq) + 2Cl^-(aq) + Pb^{2+}(aq) + 2OH^-(aq) \rightarrow Pb^{2+}(aq) + 2Cl^-(aq) + 2H_2O(\ell)$

A. 1
B. 2
C. 3
D. 4

19.

Which of the following equations describes the predominant reaction that occurs at the equivalence point of a titration between $CH_3COOH(aq)$ and $NaOH(aq)$?

A. $H^+(aq) + OH^-(aq) \rightleftarrows H_2O(\ell)$

B. $CH_3COO^-(aq) + H_2O(\ell) \rightleftarrows CH_3COOH(aq) + OH^-(aq)$

C. $CH_3COOH(aq) + NaOH(aq) \rightleftarrows NaCH_3COO(aq) + H_2O(\ell)$

D. $H^+(aq) + CH_3COO^-(aq) + Na^+(aq) + OH^-(aq) \rightleftarrows Na^+(aq) + CH_3COO^-(aq) + H_2O(\ell)$

A. 1
B. 2
C. 3
D. 4

20.

$HCN(aq)$	+	$H_2O(\ell)$	$\rightleftarrows$	$H_3O^+(aq)$	+	$CN^-(aq)$
1.0 M				2.2×10^{-5} M		2.2×10^{-5} M

What could be added to 1.0 L of this solution in order for it to behave as a true buffer?

A. 1.0 mol HCl
B. 1.0 mol HCN
C. 1.0 mol H_3O^+
D. 1.0 mol NaCN

A. 1
B. 2
C. 3
D. 4

21.

Consider the following buffer equilibrium system:

$$H_2CO_3(aq) + H_2O(\ell) \rightleftarrows H_3O^+(aq) + HCO_3^-(aq)$$

What is the net result of adding a small amount of HCl ?

A. The $[H_3O^+]$ increases slightly.
B. The pH remains the same.
C. The pH increases slightly.
D. The $[H_2CO_3]$ decreases slightly.

A. 1
B. 2
C. 3
D. 4

22.

Four samples of rain are collected from different geographic regions and the pH is measured for each sample.

Sample	pH
1	2.8
2	4.0
3	6.2
4	6.8

Which of the above samples would be classified as *acid rain*?

A. 1 only
B. 1 and 2
C. 1, 2 and 3
D. 1, 2, 3 and 4

A. 1
B. 2
C. 3
D. 4

23.

Which of the following represents a reaction that can occur between a non-metallic oxide and water?

A. $SO_2 + H_2O \rightarrow H_2SO_3$
B. $Na_2O + H_2O \rightarrow 2NaOH$
C. $CaO + H_2O \rightarrow Ca(OH)_2$
D. $NO_2 + H_2O \rightarrow H_2NO + O_2$

A. 1
B. 2
C. 3
D. 4

24.

An oxide of which of the following elements will form a solution that acts only as a base?

A. P
B. N
C. Zn
D. Ba

A. 1
B. 2
C. 3
D. 4

Science 10

Sample Exam A

Provincial Examination — Answer Key

Question Number	Keyed Response
1.	D
2.	A
3.	D
4.	C
5.	D
6.	D
7.	A
8.	A
9.	D
10.	D
11.	D
12.	C
13.	D
14.	D
15.	A
16.	D
17.	A
18.	C
19.	A
20.	B
21.	D

Question Number	Keyed Response
22.	D
23.	C
24.	B
25.	B
26.	C
27.	D
28.	D
29.	A
30.	D
31.	C
32.	D
33.	B
34.	C
35.	D
36.	D
37.	B
38.	A
39.	B
40.	D
41.	D
42.	D

Question Number	Keyed Response
43.	A
44.	C
45.	C
46.	C
47.	D
48.	A
49.	B
50.	B
51.	D
52.	C
53.	B
54.	A
55.	B
56.	D
57.	C
58.	A
59.	D
60.	D

Question Number	Keyed Response
61.	C
62.	B
63.	C
64.	B
65.	A
66.	A
67.	A
68.	B
69.	A
70.	C
71.	D
72.	C
73.	A
74.	C
75.	B
76.	B
77.	C
78.	D
79.	B
80.	B