8.1 Theories & Reactions of Acids & Bases

Question Paper

Course	DP IB Chemistry
Section	8. Acids & Bases
Topic	8.1 Theories & Reactions of Acids & Bases
Difficulty	Hard

Time allowed: 20

Score: /10

Percentage: /100

Question 1

Some species may be classified as amphiprotic, some as amphoteric and some as both. Which of the following applies to HPO_4^{2-}?

A. Amphiprotic but not amphoteric

B. Amphoteric but not amphiprotic

C. Amphiprotic and amphoteric

D. Neither amphiprotic nor amphoteric

[1 mark]

Question 2

The aromatic compound phenol, C_6H_5OH, behaves as a weak acid, due the presence of a hydroxyl group on the benzene ring. What is the correct formula of the conjugate base formed when phenol dissociates?

A. $C_6H_4^-$-OH

B. C_6H_5-OH_2^+

C. C_6H_5-O^-

D. $C_6H_6^+$-OH

[1 mark]

Question 3

What is the sum of the coefficients when the following acid-base equation is balanced?

$$\_Al_2(CO_3)_3\,(s) + \_HNO_3\,(aq) \rightleftharpoons \_Al(NO_3)_3\,(aq) + \_H_2O\,(l) + \_CO_2\,(g)$$

A. 6

B. 7

C. 14

D. 15

[1 mark]

Question 4

Which of the following substances can be used to prepare magnesium sulfate by a neutralization reaction with dilute sulfuric acid?

I. Mg
II. MgO
III. $MgCO_3$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

[1 mark]

Question 5

Phosphoric acid is a **polyprotic** acid and can produce amphiprotic species when it dissociates. Which of the following species is amphiprotic?

I. HPO_4^{2-}
II. $H_2PO_4^-$
III. PO_4^{3-}

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

[1 mark]

Question 6

Use the following reactions to answer the question below:

$$H_2O\,(l) + F^-\,(aq) \rightleftharpoons HF\,(aq) + OH^-\,(aq)$$

$$H_2O\,(l) + HNO_3\,(aq) \rightarrow H_3O^+\,(aq) + NO_3^-\,(aq)$$

$$H_2O\,(l) + CO_2\,(g) \rightleftharpoons H_2CO_3\,(aq)$$

$$H_2O\,(aq) + NH_3\,(aq) \rightleftharpoons NH_4OH\,(aq)$$

Which of the following statements is true?

A. HNO_3 and H_2O both act as acids once

B. H_2O is shown acting as a Bronsted-Lowry acid only

C. H_2O reacts as an acid twice

D. H_2O is shown as a diprotic acid

[1 mark]

Question 7

Which species are Bronsted-Lowry acids in the reaction shown?

$$H_2PO_4^-\,(aq) + CN^-\,(aq) \rightleftharpoons HCN\,(aq) + HPO_4^{2-}\,(aq)$$

A. HCN and $H_2PO_4^-$

B. HCN and CN^-

C. $H_2PO_4^-$ and HPO_4^{2-}

D. HCN and HPO_4^{2-}

[1 mark]

Question 8

Which of the following solutions will react with a strip magnesium ribbon?

A. Sodium hydrogencarbonate

B. Sodium hydrogensulfate

C. Ammonia

D. Limewater

[1 mark]

Question 9

Which substance reacts with ammonia but is not a Brønsted–Lowry acid?

A. HCl

B. CH_3COOH

C. BF_3

D. CF_3COOH

[1 mark]

Question 10

Which row shows the correct systematic name of the acid?

	Formula	Name
A	$HClO_3$	chloric(V) acid
B	H_2SO_3	hydrogensulfate(VI) acid
C	H_3PO_3	phosphoric(V) acid
D	HNO_2	nitrous acid

[1 mark]