

# 8.1 Theories & Reactions of Acids & Bases

## Question Paper

Course	DPIB Chemistry
Section	8. Acids & Bases
Topic	8.1 Theories & Reactions of Acids & Bases
Difficulty	Easy

**Time allowed:** 30  
**Score:** /24  
**Percentage:** /100

**Question 1a**

a)

Define a *Brønsted-Lowry acid*.

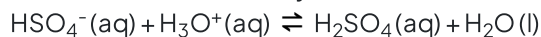
[1]

[1 mark]

**Question 1b**

b)

Which species in the following reaction acts as a Brønsted-Lowry base.



[1]

[1 mark]

**Question 1c**

c)

Which species in the following equation is acting as a Brønsted-Lowry acid.



[1]

[1 mark]

**Question 1d**

d)

Explain, using the Brønsted-Lowry theory, how water can act either as an acid or a base.

[2]

[2 marks]

**Question 2a**

a)

Describe the difference between an amphiprotic and amphoteric species.

[1]

[1 mark]

**Question 2b**

b)

Write an equation to show ammonia,  $\text{NH}_3$ , acting as both a Brønsted–Lowry base and a Brønsted–Lowry acid.

Brønsted–Lowry base: .....

Brønsted–Lowry acid: .....

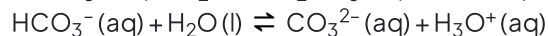
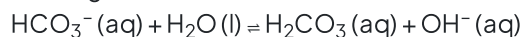
[2]

[2 marks]

**Question 2c**

c)

The equations for two acid–base reactions are given below.



Identify two different amphoteric species in the above reactions.

[1]

[1 mark]

**Question 2d**

d)

i) State what is meant by the term conjugate base.

[1]

ii) State the conjugate base of the hydroxide ion,  $\text{OH}^-$ 

[1]

[2 marks]

### Question 3a

a)

State an equation for the reaction of magnesium carbonate with dilute hydrochloric acid.

[1]

[1 mark]

### Question 3b

b)

State an equation for the reaction of lithium oxide with dilute nitric acid.

[1]

[1 mark]

### Question 3c

c)

Which acid and base would be required to produce ammonium sulfate,  $(\text{NH}_4)_2\text{SO}_4$ .

[2]

[2 marks]

### Question 3d

d)

Nitric acid and calcium hydroxide react together.

i) State the type of reaction that takes place.

[1]

ii) State the formula of the products of the reaction.

[1]

iii) State the sign of the enthalpy change for this reaction.

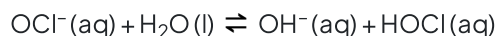
[1]

[3 marks]

### Question 4a

a)

Identify one conjugate acid-base pair in the reaction.



[1]

[1 mark]

### Question 4b

b)

State an equation for the reaction of aluminium hydroxide with dilute sulfuric acid.

[1]

[1 mark]

### Question 4c

c)

State an equation for the reaction of calcium hydrogencarbonate with dilute phosphoric acid,  $\text{H}_3\text{PO}_4$ .

[1]

[1 mark]

### Question 4d

d) Write the formulae for the following:

i) Carbonic acid. [1]

ii) Ammonium sulfate. [1]

iii) Magnesium ethanoate. [1]

[3 marks]