سلطنة عمان
وزارة التربية والتعليم

امتحان دبلوم التعليم العام للمدارس الخاصة (ثنائية اللغة)
للعام الدراسي ١٤٣٨/١٤٣٩ هـ - ٢٠١٧ / ٢٠١٨ م
الدور الثاني - الفصل الدراسي الثاني

تنبيه:
- المادة: الكيمياء.
- الأسئلة في (١٤) صفحة.
- زمن الإجابة: ثلاث ساعات.
- الإجابة في الورقة نفسها.

تعليمات مهمة:

- يجب الحضور إلى قاعة الامتحان قبل عشر دقائق على الأقل من بدء زمن الامتحان.
- يجب إحضار أصل ما يثبت الهوية وإبرازها للعاملين بالامتحانات.
- يجب الالتزام بالزي (الدشداشة البيضاء والمصر أو الكمة للذكور) والزي المدرسي للطالبات ، ويستثنى من ذلك الدارسون من غير العمانيين بشرط الالتزام بالذوق العام، ويمنع على جميع المتقدمات ارتداء النقاب داخل المركز وقاعات الامتحان.
- يحظر على الممتحنين اصطحاب الهواتف النقالة وأجهزة النداء الآلي وآلات التصوير والحواسيب الشخصية والساعات الرقمية الذكية والآلات الحاسبة ذات الصفة التخزينية والمجلات والصحف والكتب الدراسية والدفاتر والمذكرات والحقائب اليدوية والآلات الحادة أو الأسلحة أياً كان نوعها وأي شيء له علاقة بالامتحان.
- يجب على الممتحن الامتثال لإجراءات التفتيش داخل المركز طوال أيام الامتحان.
- يجب على الممتحن التأكد من استلام دفتر امتحانه، مغلفاً بغلاف بلاستيكي شفاف وغير ممزق ، وهو مسؤول عنه حتى يسلمه لمراقبي اللجنة بعد الانتهاء من الإجابة.
- يجب الالتزام بضوابط إدارة امتحانات دبلوم التعليم العام وما في مستواه وأية مخالفة لهذه الضوابط تعرضك للتدابير والإجراءات والعقوبات المنصوص عليها بالقرار الوزاري رقم ٥٨٨ / ٢٠١٥.
- يقوم المتقدم بالإجابة عن أسئلة الامتحان المقالية بقلم الحبر (الأزرق أو الأسود).
- يقوم المتقدم بالإجابة عن أسئلة الاختيار من متعدد بتظليل الشكل (▭) وفق النموذج الآتي:

س - عاصمة سلطنة عمان هي:

▭ القاهرة ▭ الدوحة

■ مسقط ▭ أبوظبي

ملاحظة: يتم تظليل الشكل (■) باستخدام القلم الرصاص وعند الخطأ، امسح بعناية لإجراء التغيير.

صحيح ■ **غير صحيح** ▭ ◉ ◥ ☒ ☑

مُسَوَّدَة، لا يتم تصحيحها

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Question 1: Multiple Choice Items (28 marks)

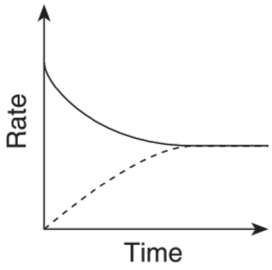
There are 14 multiple-choice items worth two marks each.
Shade in the bubble (○) next to the **correct** answer for each of the following items.

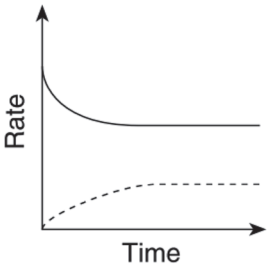
1) Which of the following options is correct about the uses of nitric acid and sulphuric acid?

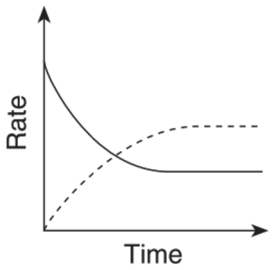
	HNO_3	H_2SO_4	Both HNO_3 and H_2SO_4
○	explosive	plastics	fertilisers
○	detergents	explosive	fertilisers
○	plastics	fertilisers	detergents
○	fertilisers	explosive	detergents

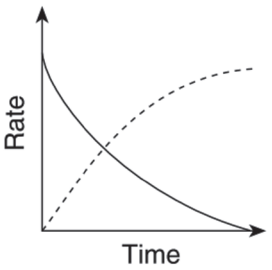
2) Which of the following graphs shows how the rates of forward and backward reactions change when hydrogen and iodine are mixed until an equilibrium is reached?

———— = Forward reaction ---------- = Backward reaction

○ 

○ 

○ 

○ 

Question 1 continued

3) Consider the following equilibrium system:

$$\underset{\text{pale yellow}}{N_2O_{4(g)}} \rightleftharpoons \underset{\text{dark brown}}{2NO_{2(g)}}$$

Which of the following combinations describes the effect of increasing the pressure of the system?

	Colour of the mixture	Value of Kc
☐	dark brown	increases
☐	pale yellow	remains constant
☐	dark brown	remains constant
☐	pale yellow	increases

4) Consider the equilibrium system below:

$$2CrO_4^{2-}{}_{(aq)} + 2H^+_{(aq)} \rightleftharpoons Cr_2O_7^{2-}{}_{(aq)} + H_2O_{(l)}\,, \quad \Delta H > 0$$

Which of the following changes will increase the concentration of $Cr_2O_7^{2-}$?

I. Adding 2.0M HNO_3.

II. Increasing the pressure.

III. Adding $Ba(NO_3)_{2(aq)}$, ($BaCrO_{4(s)}$ is formed).

IV. Increasing the temperature.

☐ I and III ☐ II and III

☐ I and IV ☐ III and IV

5) Generally, which of the following indicates that an equilibrium system favours reactants?

☐ 80% yield ☐ Positive ΔH

☐ High reaction rate. ☐ Small K_{eq}

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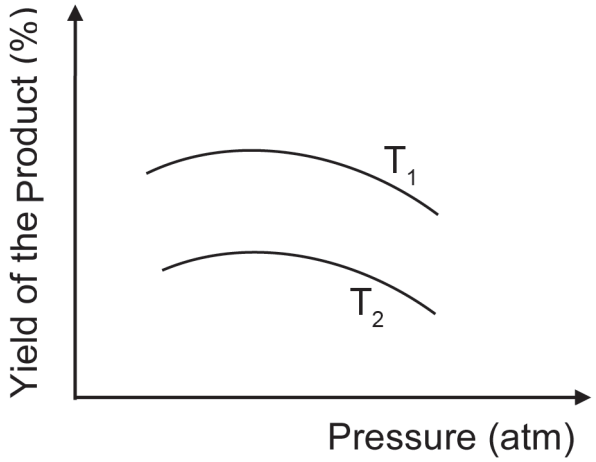
Do not write in this space

Question 1 continued

6) The graph below shows the effect of temperature and pressure on the yield of the products in a gaseous endothermic equilibrium system.



Which of the following options is correct about this equilibrium system?

	Temperature	Number of gas molecules	Equilibrium constant
☐	$T_2 > T_1$	more gas molecules of reactants	$K_p2 < K_p1$
☐	$T_2 > T_1$	less gas molecules of reactants	$K_p2 > K_p1$
☐	$T_2 < T_1$	more gas molecules of reactants	$K_p2 > K_p1$
☐	$T_2 < T_1$	less gas molecules of reactants	$K_p2 < K_p1$

7) Consider the following equilibrium reaction:

$$2NO_{(g)} \rightleftharpoons N_{2(g)} + O_{2(g)}, \quad K_{eq} = 2.1 \times 10^{30}$$

Which of the following options is correct at equilibrium?

☐ $[NO]^2 < [N_2][O_2]$ ☐ $[NO]^2 > [N_2][O_2]$

☐ $[NO] = [N_2][O_2]$ ☐ $[NO] > [N_2][O_2]$

8) What is the conjugate base of HCO_3^-?

☐ H_2CO_3 ☐ CO_3^{2-}

☐ H^+ ☐ OH^-

Do not write in this space

Question 1 continued

9) Which of the following combinations would make a buffer solution?

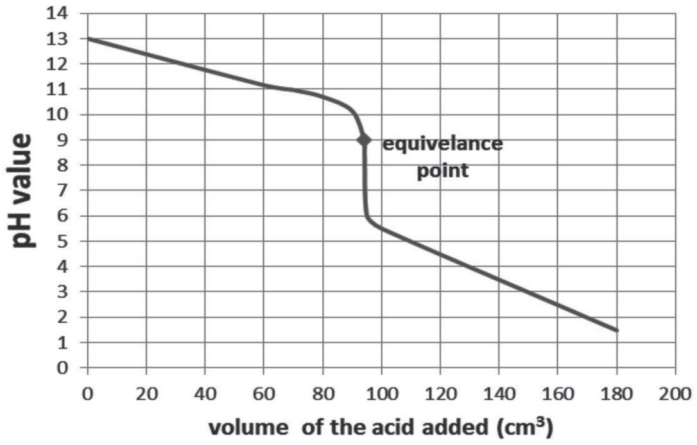
- ☐ HCl/CH_3COOCl
- ☐ HF/NaF
- ☐ NH_3/NH_4OH
- ☐ CH_3COOH/NH_4Cl

10) If $[H^+]$ at the equivalence point is calculated to be 1.0×10^{-4} mol.dm^{-3} for a particular titration, which of the following acid–base indicators is more suitable for this titration?

Indicator	pK_{Ind}	pH range
Methyl orange	4.2	3.2 – 4.4
Bromocresol green	4.7	3.8 – 5.4
Bromothymol blue	7.1	6.0 – 7.6
Phenol red	7.4	6.6 – 8.0

- ☐ Methyl orange
- ☐ Bromocresol green
- ☐ Bromothymol blue
- ☐ Phenol red

The following graph shows the pH curve for the titration of 0.1 moldm^{-3} of unknown acid (HX) against 40cm^3 of unknown base (YOH) (0.1 moldm^{-3}).



11) What is the type of this titration in terms of acid-base strength?

- ☐ Strong acid against strong base
- ☐ Strong acid against weak base
- ☐ Weak acid against strong base
- ☐ Weak acid against weak base

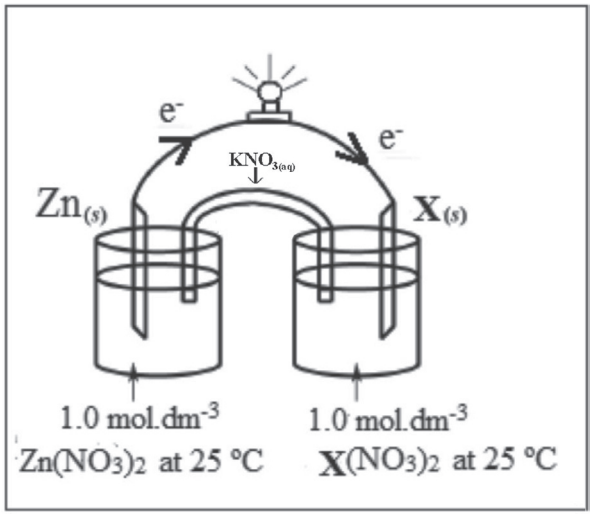
Do not write in this space

Question 1 continued

12) Which of the following statements is **incorrect** about the changes that occur in the electrochemical cells?

- ☐ The reduced electrode earns electrons.
- ☐ The current flows in the circuit until two of the reactants are used up.
- ☐ Oxidation occurs at the electrode with the lower standard electrode potential.
- ☐ The e.m.f of a cell varies depending on the temperature, pressure and concentration of solution.

Study the diagram below to answer questions 13 and 14.



13) Which of the following options is correct for this cell?

- ☐ X gets reduced.
- ☐ Zn electrode accepts electrons.
- ☐ Zn^{2+} is weaker oxidizing agent than X^{2+}.
- ☐ X has a greater tendency to lose electrons.

14) Which cell diagram represents the reaction occurs in this cell:

- ☐ $Zn^{2+}(aq) \mid Zn(s) \,\vdots\, X(s) \mid X^{2+}(aq)$
- ☐ $Zn(s) \mid Zn^{2+}(aq) \,\vdots\, X^{2+}(aq) \mid X(s)$
- ☐ $X(s) \mid X^{2+}(aq) \,\vdots\, Zn(s) \mid Zn^{2+}(aq)$
- ☐ $X(s) \mid X^{2+}(aq) \,\vdots\, Zn^{2+}(aq) \mid Zn(s)$

Question 2: Extended Questions (42 marks)

Write your answer for each of the following questions in the space provided.
Be sure to show all your work, including the correct units where applicable.

15) In the contact process, sulphur dioxide is catalytically oxidized to sulphur trioxide according to the following equation:

$$2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)} \qquad \Delta H = -197 \text{ kJ mol}^{-1}$$

The table below shows the theoretical conditions and the industrial conditions used for the preparation of sulphur trioxide. Study it to answer the following questions:

Conditions	Temperature (°C)	Pressure (kPa)
Theoretical	200	300
Industrial	450	105

a. What is the catalyst used in this process?

b. Explain why the lower temperature results in a higher yield of sulphur trioxide in the equilibrium mixtures.

c. Explain why in industry a pressure of 105 kPa is used to produce sulphur trioxide rather than a higher pressure?

Question 2 continued

16) Study the equilibrium reactions shown in the table below and their corresponding equilibrium constants and different ΔH° to answer the following questions:

	Reactions	ΔH° (kJ mol^{-1})	Kc
(1)	$H_2O_{(g)} + C_{(s)} \rightleftharpoons H_{2(g)} + CO_{(g)}$	+131	3.0×10^{-2}
(2)	$CO_{(g)} + 2H_{2(g)} \rightleftharpoons CH_3OH_{(g)}$	–91	14.5
(3)	$CH_{4(g)} + H_2O_{(g)} \rightleftharpoons CO_{(g)} + 3H_{2(g)}$	+206	1.78×10^{-3}
(4)	$4HCl_{(g)} + O_{2(g)} \rightleftharpoons 2H_2O_{(g)} + 2Cl_{2(g)}$	–116	20.0×10^{2}

a. In which of the above reactions the position of equilibrium will shift to the right by adding $H_2O_{(g)}$?

b. What is the effect on the yield of reaction (3) when a catalyst is used?

c. In which of the reactions the position of equilibrium will shift to the left upon an increase in pressure, but to the right upon an increase in temperature?

d. In which of the above reactions the products predominate in the equilibrium mixture?

e. What is the units of the equilibrium constant Kc for reaction (2)?

f. Calculate the value of Kc for the following reaction.

$$H_{2(g)} + CO_{(g)} \rightleftharpoons H_2O_{(g)} + C_{(s)}$$

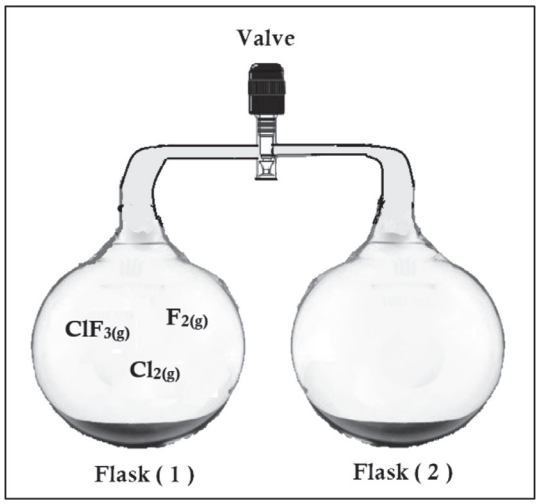
Question 2 continued

17) Chlorine trifluoride is a gas decomposes into its elements as indicated in the reaction below:

$$2ClF_{3(g)} \rightleftharpoons 3F_{2(g)} + Cl_{2(g)}$$

colourless pale yellow yellow-greenish

The diagram below shows two flasks connected via a closed valve. Flask (1) contains a pale yellow mixture of $ClF_{3(g)}$, $F_{2(g)}$ and $Cl_{2(g)}$) at equilibrium at room temperature. Study it to answer the following questions:



a. When the equilibrium mixture in flask (1) is cooled, its colour fades. Is the backward reaction endothermic or exothermic? Explain your answer.

b. What is the effect on the position of the equilibrium if the valve is opened at a constant temperature? Explain your answer.

Question 2 continued

18) Hydrogen gas can be made from carbon monoxide and steam as shown in the following equation.

$$CO_{(g)} + H_2O_{(g)} \rightleftharpoons CO_{2(g)}) + H_{2(g)} \qquad \Delta H = -41 \text{ kJ mol}^{-1}$$

The concentrations of two equilibrium mixtures at different temperatures are listed in the table below. Study them to answer the following questions:

	$CO_{(g)}$	$H_2O_{(g)}$	$CO_{2(g)}$	$H_{2(g)}$
Equilibrium (1)	0.100	0.025	0.075	0.061
Equilibrium (2)	0.116	0.041	0.059	0.045

a. Write the equilibrium constant Kc expression for this reaction?

b. Calculate the value of the Kc in equilibrium (1)?

c. What is the effect on the value of equilibrium constant for the forward reaction when the temperature is increased? Explain your answer.

d. Which equilibrium (1 or 2) is at a higher temperature? Explain your answer.

Question 2 continued

19) If the species $HB^-_{(aq)}$ is known to be a proton donor.

a. Write the dissociation equation for this species.

b. Write the equilibrium constant expression for the dissociation equation of this species.

20) The table below shows three acidic solutions and their Ka values.

Solutions	HA	HB	HC
Ka	8.4×10^{-4}	7.2×10^{-4}	1.4×10^{-3}

a. What is the relationship between the Ka of an acid and its strength?

b. Which solution has the lowest concentration of H^+?

c. Calculate the concentration of the acid (HB) if its pH is 2.0

Question 2 continued

21) A 1.0 L buffer solution was prepared by adding 0.25 mol of acetic acid ($K_a = 1.7 \times 10^{-5}$) and 0.25 mol of sodium acetate.

a. Calculate the pH of this buffer solution.

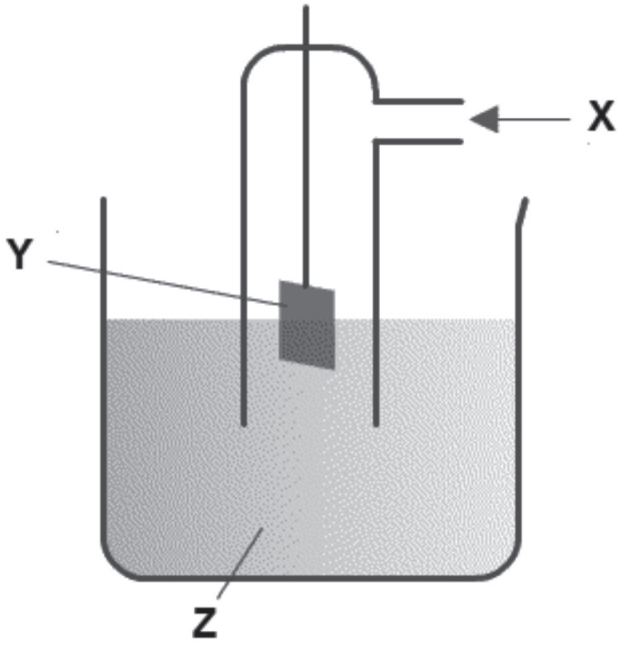
b. Which of the following two reactions will take place if a small amount of nitric acid is added to the buffer solution?. Explain your answer.

Reaction 1: $CH_3COO^-_{(aq)} + H^+_{(aq)} \rightleftharpoons CH_3COOH_{(aq)}$

Reaction 2: $CH_3COOH_{(aq)} \rightleftharpoons CH_3COO^-_{(aq)} + H^+_{(aq)}$

Question 2 continued

22) The diagram below shows the standard hydrogen half-cell. Study it to answer the following questions.



a. What is the standard hydrogen half-cell used for?

_____

b. Name the components represented by (X), (Y) and (Z)

X: _____

Y: _____

Z: _____

c. Write the half-cell diagram as a short-hand way to represent the half-cell reduction reaction that takes place at the standard hydrogen half-cell.

_____

Question 2 continued

23) The table below shows six half cells with their standard electrode potentials (E^0/V). Study it to answer the following questions.

Half cell	E^0/ V
$Ni^{2+}_{(aq)} \mid Ni(s)$	−0.26
$Pt \mid Cl_{2(g)}, 2Cl^-_{(aq)}$	+1.36
$Zn^{2+}_{(aq)} \mid Zn_{(s)}$	−0.76
$Mg^{2+}_{(aq)} \mid Mg_{(s)}$	−2.37
$Fe^{2+}_{(aq)} \mid Fe_{(s)}$	−0.44
$Al^{3+}_{(aq)} \mid Al_{(s)}$	−1.66

a. For an electrochemical cell setup between (Ni) and (Fe) half cells.

(i) Draw a labeled diagram for this cell.

(ii) What is the direction of electron flow through the wire in this cell?

Question 2 continued

(iii) Write the half-cell oxidation and reduction reactions that occur in this cell.

The half-cell oxidation reaction: _____

_____

The half-cell reduction reaction: _____

_____

b. Calculate the standard electromotive force (E^0 cell) for the cell setup between (Mg) and (Al).

_____

_____

_____

_____

_____

_____

_____

c. Can we save a solution of $NiCl_2$ in a beaker made from Zinc? Explain your answer.

_____

_____

_____

_____

[End of the Examination]

مُسَوَّدَة

مُسَوَّدَة

MARKING GUIDE

GENERAL EDUCATION DIPLOMA

BILINGUAL PRIVATE SCHOOLS

SEMESTER TWO - SECOND SESSION

CHEMISTRY

2017 / 2018

General Education Diploma, Semester Two, Second Session
Bilingual Private Schools, Chemistry, 2017/2018

Exam Specifications:

Topics of the units	Weighting	Multiple choice (40%)		Extended response (60%)		Cognitive levels			Total
		Number of questions	Marks	Number of questions	Marks	Knowing (30%)	Applying (50%)	Reasoning (20%)	
Equilibrium mixture	26 %	4	8	3	10	5	9	4	18
Equilibrium constant	19 %	3	6		7	4	7	2	13
Acid/base equilibria	31 %	4	8		14	7	11	4	22
Electrode potential	15 %	3	6		11	5	8	4	17
Total	100 %	14	28	3	42	21	35	14	70

General Education Diploma, Semester Two, Second Session
Bilingual Private Schools, Chemistry, 2017/2018

Distribution of cognitive domains and marks.

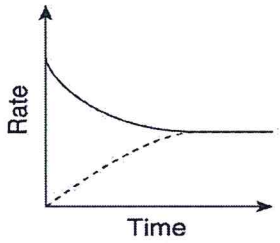
Serial No	Question number	Item	Mark	Unit	Page	Cognitive domain	Output
1	1	1	2	Equilibrium mixture	365	Knowing	6
2	1	2	2	Equilibrium mixture	357	Applying	1, 2
3	1	3	2	Equilibrium mixture	359	Applying	3
4	1	4	2	Equilibrium mixture	358-361	Reasoning	3
5	1	5	2	Equilibrium constant	370	Knowing	3
6	1	6	2	Equilibrium constant	374-375	Reasoning	5
7	1	7	2	Equilibrium constant	368, 370	Applying	1, 3
8	1	8	2	Acid/base equilibria	382	Applying	3
9	1	9	2	Acid/base equilibria	392	Knowing	9
10	1	10	2	Acid/base equilibria	391	Reasoning	8
11	1	11	2	Acid/base equilibria	391	Applying	7
12	1	12	2	Electrode potential	408	Knowing	1
13	1	13	2	Electrode potential	411	Applying	5i
14	1	14	2	Electrode potential	409	Applying	3
15	2	15.a	1	Equilibrium mixture	361	Knowing	4
16	2	15.b	1	Equilibrium mixture	361	Knowing	4
17	2	15.c	1	Equilibrium mixture	361	Knowing	4
18	2	16.a	1	Equilibrium mixture	358	Applying	3
19	2	16.b	1	Equilibrium mixture	358	Knowing	3
20	2	16.c	1	Equilibrium mixture	359-360	Applying	3
21	2	16.d	1	Equilibrium constant	370	Knowing	3
22	2	16.e	1	Equilibrium constant	369	Applying	2
23	2	16.f	1	Equilibrium constant	368	Knowing	2
24	2	17.a	2	Equilibrium mixture	360	Applying/ Reasoning	3
25	2	17.b	2	Equilibrium mixture	359	Applying/ Reasoning	3
26	2	18.a	1	Equilibrium constant	368	Applying	1
27	2	18.b	1	Equilibrium constant	369	Applying	4
28	2	18.c	2	Equilibrium constant	375	Reasoning	5
29	2	18.d	2	Equilibrium constant	375	Reasoning	5
30	2	19.a	1	Acid/base equilibria	385	Applying	6

31	2	19.b	1	Acid/base equilibria	385	Applying	6
32	2	20.a	1	Acid/base equilibria	385	Knowing	6
33	2	20.b	1	Acid/base equilibria	385	Knowing	5
34	2	20.c	3	Acid/base equilibria	386	Applying	5,6
35	2	21.a	3	Acid/base equilibria	393	Applying	5,6
36	2	21.b	2	Acid/base equilibria	392	Knowing	9
37	2	22.a	1	Electrode potential	410	Knowing	4
38	2	22.b	1½	Electrode potential	410	Knowing	4
39	2	22.c	½	Electrode potential	410	Knowing	4, 3
40	2	23.a.i	2	Electrode potential	408	Applying	2
41	2	23.a.ii	1	Electrode potential	408	Applying	2
42	2	23.a.iii	1	Electrode potential	409	Applying	1
43	2	23.b	1	Electrode potential	412	Applying	5ii
44	2	23.c	2	Electrode potential	411	Reasoning	6

TOTAL MARKS: 70 **PAGES: (5)**

Question One **(28 Marks)**

There are 14 multiple-choice items. Each correct answer is worth TWO marks.

Item	Correct option	
1	**a)**	explosive plastics fertilisers
2	**a)**	
3	**b)**	pale yellow remains constant
4	**c)**	I and IV
5	**d)**	Small K_{eq}
6	**d)**	T2< T1 less gas molecules of reactants K2< K1
7	**a)**	$[NO]^2 < [N_2][O_2]$
8	**b)**	CO_3^{2-}
9	**b)**	HF/NaF
10	**a)**	methyl orange
11	**c)**	Weak acid against strong base
12	**b)**	The current flows in the circuit until two of the reactants are used up.
13	**c)**	Zn^{2+} is weaker oxidizing agent than X^{2+}.
14	**b)**	Zn (s) | Zn^{2+}(aq)⁞⁞ X^{2+}(aq) | X(s)

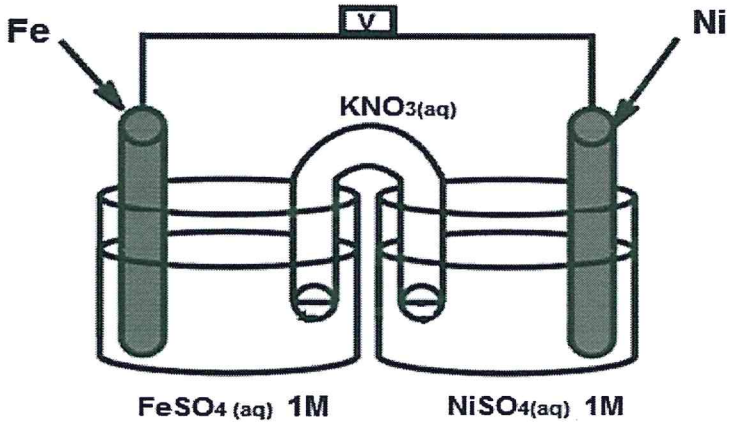
Question Two **(42 Marks)**

Part	*Section*	*The answer*	*The mark*
15	**a**	Vanadium(v) oxide catalyst. Or V_2O_5	1
	b	The forward reaction is exothermic, giving out heat. So if the temperature is decreased the forward reaction is favoured, as this will raise the temperature. Therefore, at low temperature, the equilibrium mixture will have more SO_3.	1
	c	At lower pressure, the cost of building and running the plant is lower **or** with high yield reaches 97% it is not worth it spending too much money to compress gases.	1
16	**a**	Reactions (1) and (3). * *Each answer worth (½ mark).*	1
	b	A catalyst does not affect the yield of the equilibrium.	1
	c	Reactions (1) and (3). * *Each answer worth (½ mark).*	1
	d	Reactions (2) and (4). * *Each answer worth (½ mark).*	1
	e	Units of Kc: $mol^{-2}dm^6$	1
	f	From reactions (1): $K_c' = \frac{1}{K_c} = \frac{1}{3.0x10^{-2}} = 33.33\ mol^{-1}\ dm^3$	1
17	**a**	The backward reaction is exothermic. (1 mark) When the system is cooled, its colour fades because the concentration of $ClF_{3(g)}$ increases. It can be deduced that when the temperature is decreased, the system will undergo a net backward reactionso as to raise the temperature. Thus, the backward reaction should be an exothermic reaction. (1 mark)	2
	b	The position of equilibrium shifts to the right (products). (1 mark) If the valve is opened this will decreases the pressure by increasing the volume, the position of equilibrium shifts to try to increase the pressure. It moves to the right, to the side with the highest molecules of gas. (1 mark)	2

18	**a**	$K_c = \dfrac{[CO_{2(g)}]\,[H_{2(g)}]}{[CO_{(g)}]\,[H_2O_{(g)}]}$	1
	b	$K_c = \dfrac{0.075 \times 0.061}{0.100 \times 0.025} = 1.83$	1
	c	K_c decreases. (1 mark) The forward reaction is exothermic as the temperature increases the position of the equilibrium will shift to the left, thereby reducing the temperature. The new equilibrium mixture will contain more of the reactants, and less products, than the original mixture. (1 mark)	2
	d	Equilibrium (2) is at a higher temperature. (1 mark) The forward reaction is exothermic which favours decreasing the temperature. The equilibrium (2) contain more of the reactants, and less products, contrasted to the equilibrium (1). (1 mark)	2
19	**a**	$HB^-_{(aq)} \rightleftharpoons B^{2-}_{(aq)} + H^+_{(aq)}$	1
	b	$K_a = [B^{2-}][H^+]/HB^-]$	1
20	**a**	The higher the Ka the stronger the acid or they are directly proportional to each other.	1
	b	HB	1
	c	$pH = -\log[H^+]$ (½) $2.0 = -\log[H^+]$ (½) $[H^+] = 0.01$ mol.dm^{-3} (½) $K_a = [H+][B-]/[HB]$ (½) $7.2 \times 10^{-4} = (0.01)^2/[HB]$ (½) $[HB] = 0.14$ mol.dm^{-3} (½)	3

21	**a**	$K_a = [CH_3COO^-][H^+]/[CH_3COOH]$ (½) $1.7 \times 10^{-5} = 0.25 \times [H^+]/0.25$ (½) $[H^+] = 1.7 \times 10^{-5}$ mol.dm^{-3} (½) pH = - log [H+] (½) = - log (1.7×10^{-5}) (½) = 4.8 (½)	3
	b	Reaction 1 (`1mark) CH_3COO^- from sodium ethanoate will be dissociated to mop up the H^+ ions added from the nitric acid. (1mark)	2
22	**a**	As a reference point to measure the potential E^0(v) for different half cells.	1
	b	X : $H_{2(g)}$ or Hydrogen Y : Pt or platinum electrode , Z : $HCl_{(aq)}$ or $H^+_{(aq)}$	1½
	c	$2H^+_{(aq)}$, $H_{2\,(g)}$ | Pt	½

Continue Question Two

Part	***Section***	***The answer***	***The mark***
23	a.i	 *Note: any correct salt of Fe2+ and Ni2+ can be used and any correct salt in the salt bridge* *Each half cell (1 mark)*	2
	a.ii	From (Fe) or iron to (Ni) or nickel .	1
	a.iii	The half-cell oxidation reaction : $Fe_{(s)} \longrightarrow Fe^{2+}_{(aq)} + 2e^-$ The half-cell reduction reaction : $Ni^{2+}_{(aq)} + 2e^- \longrightarrow Ni_{(s)}$ *1 mark for each correct half-cell*	2
	b.	E^0 cell = (+2.37) + (- 1.66) E^0 cell= 0.71 V	1
	c.	No (1mark) Zinc will be oxidized and Ni^{2+} will be reduced or there will be a reaction between zinc and Ni^{2+} because standard electrode potential of Ni^{2+} is higher than of Zn^{2+} or vice versa. (1mark)	2

This is the end of the Marking Guide