

SULIT



BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN MALAYSIA

JABATAN KEJURUTERAAN PETROKIMIA

PEPERIKSAAN AKHIR

SESI JUN 2019

DMT 10013

DGP1023: FUNDAMENTAL OF CHEMISTRY

TARIKH : 02 NOVEMBER 2019

MASA : 2.30 PETANG – 4.30 PETANG (2 JAM)

Kertas ini mengandungi **TUJUH (7)** halaman bercetak.

Soalan Struktur (4 soalan)

Dokumen sokongan yang disertakan : Tiada

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

INSTRUCTION:

This section consists of **FOUR (4)** structured questions. Answer **ALL** questions.

ARAHAN:

Bahagian ini mengandungi EMPAT (4) soalan berstruktur. Jawab SEMUA soalan.

QUESTION 1**SOALAN 1**CLO1
C1

- (a) Write the electronic configurations, in s, p, d, f, notation for:

Tuliskan konfigurasi elektron dalam bentuk notasi s, p, d, f untuk:

- (i) Sulphur atom (S)
Atom sulfur (S)
- (ii) Oxide ion, O^{2-}
Ion oksida, O^{2-}
- (iii) Chromium ion, Cr^{3+}
Ion kromium, Cr^{3+}
- (iv) Vanadium atom (V)
Atom vanadium, (V)
- (v) Chloride ion, Cl^-
Ion klorida, Cl^-

[5 marks]

[5 markah]

CLO1
C2

- (b) Explain how the Aufbau principle, Hund's rule and Pauli's exclusion principle is used in the placement of electrons in the element ${}_{25}X$ at ground state.

Jelaskan bagaimana prinsip Aufbau, peraturan Hund dan prinsip pengecualian Pauli digunakan dalam penempatan elektron dalam unsur ${}_{25}X$.

[8 marks]

[8 markah]

CLO1
C3

(c)

1																		2																																																																																											
1 H 1.008		2																13																		14																		15																		16																		17																		18 He 4.0026	
3 Li 6.94		4 Be 9.0122																		5 B 10.81		6 C 12.011		7 N 14.007		8 O 15.999		9 F 18.998		10 Ne 20.180																																																																															
11 Na 22.990		12 Mg 24.305																		13 Al 26.982		14 Si 28.085		15 P 30.974		16 S 32.06		17 Cl 35.45		18 Ar 39.948																																																																															
19 K 39.098		20 Ca 40.078		21 Sc 44.956		22 Ti 47.867		23 V 50.942		24 Cr 51.996		25 Mn 54.938		26 Fe 55.845		27 Co 58.933		28 Ni 58.693		29 Cu 63.546		30 Zn 65.38		31 Ga 69.723		32 Ge 72.630		33 As 74.922		34 Se 78.97		35 Br 79.904		36 Kr 83.798																																																																											
37 Rb 85.468		38 Sr 87.62		39 Y 88.906		40 Zr 91.224		41 Nb 92.906		42 Mo 95.95		43 Tc (98)		44 Ru 101.07		45 Rh 102.91		46 Pd 106.42		47 Ag 107.87		48 Cd 112.41		49 In 114.82		50 Sn 118.71		51 Sb 121.76		52 Te 127.60		53 I 126.90		54 Xe 131.29																																																																											
55 Cs 132.91		56 Ba 137.33		57-71 *		72 Hf 178.49		73 Ta 180.95		74 W 183.84		75 Re 186.21		76 Os 190.23		77 Ir 192.22		78 Pt 195.08		79 Au 196.97		80 Hg 200.59		81 Tl 204.38		82 Pb 207.2		83 Bi 208.98		84 Po (209)		85 At (210)		86 Rn (222)																																																																											
87 Fr (223)		88 Ra (226)		89-103 #		104 Rf (265)		105 Db (268)		106 Sg (271)		107 Bh (270)		108 Hs (277)		109 Mt (276)		110 Ds (281)		111 Rg (280)		112 Cn (285)		113 Nh (286)		114 Fl (289)		115 Mc (289)		116 Lv (293)		117 Ts (294)		118 Og (294)																																																																											
* Lanthanide series																		57 La 138.91		58 Ce 140.12		59 Pr 140.91		60 Nd 144.24		61 Pm (145)		62 Sm 150.36		63 Eu 151.96		64 Gd 157.25		65 Tb 158.93		66 Dy 162.50		67 Ho 164.93		68 Er 167.26		69 Tm 168.93		70 Yb 173.05		71 Lu 174.																																																															
# Actinide series																		89 Ac (227)		90 Th 232.04		91 Pa 231.04		92 U 238.03		93 Np (237)		94 Pu (244)		95 Am (243)		96 Cm (247)		97 Bk (247)		98 Cf (251)		99 Es (252)		100 Fm (257)		101 Md (258)		102 No (259)		103 Lr (262)																																																															

Figure 1: Periodic Table

Rajah 1: Jadual Berkala

Referring to a periodic table, arrange and explain the following atoms in order of increasing atomic radius : P, Si, N, Al.

Merujuk kepada jadual berkala, susunkan dan terangkan atom berikut dalam susunan meningkat jejari atom: P, Si, N, Al.

[12 marks]

[12 markah]

QUESTION 2

SOALAN 2

CLO1
C1

- (a) Draw the simplest Lewis structure for each of the following molecules.
Lukiskan struktur Lewis yang paling mudah bagi setiap molekul berikut.

- (i) ClF_3
- (ii) BCl_3
- (iii) SeF_4
- (iv) NO
- (v) AlBr_3

[5 marks]

[5 markah]

CLO1
C2

- (b) Distinguish **FOUR (4)** properties between ionic compound and covalent compound in chemical bonding.

Bezakan EMPAT (4) sifat antara sebatian ionik dan sebatian kovalen dalam ikatan kimia.

[8 marks]

[8 markah]

CLO1
C3

- (c) Draw and explain why boron trifluoride, BF_3 molecule has a trigonal planar shape and beryllium hydride, BeH_2 molecule has a linear shape.

Lukiskan dan jelaskan mengapa molekul boron triflorida, BF_3 mempunyai bentuk satah trigonal dan berilium hidrida molekul, BeH_2 mempunyai bentuk linear.

[12 marks]

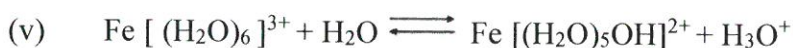
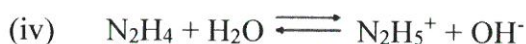
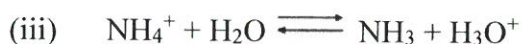
[12 markah]

QUESTION 3

SOALAN 3

CLO1
C1

- (a) Identify the acid and the conjugate acid for the following reversible reactions.
Kenalpasti asid dan konjugat asid bagi setiap persamaan tindakbalas berbalik di bawah:



[5 marks]

[5 markah]

CLO1
C2

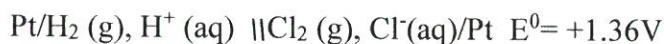
- (b) In a NaOH solution $[\text{OH}^-]$ is $2.9 \times 10^{-4} \text{ M}$. Calculate the pH of the solution.
Larutan NaOH $[\text{OH}^-]$ ialah $2.9 \times 10^{-4} \text{ M}$. Kirakan pH larutan tersebut.

[7 marks]

[7 markah]

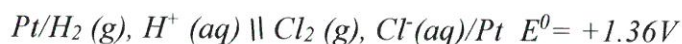
CLO1
C3

- (c) A cell is set up between chlorine electrode and a hydrogen electrode.



- (i) Draw a diagram to show the apparatus and chemicals used.
 (ii) Discuss the chemical reactions occurring in the electrochemical cell.

Satu sel ditubuhkan antara elektrod klorin dan elektrod hidrogen.



- (i) *Lukiskan gambar rajah untuk menunjukkan radas dan bahan kimia yang digunakan.*
 (ii) *Bincangkan tindak balas kimia yang berlaku dalam sel elektrokimia.*

[13 marks]

[13 markah]

QUESTION 4

SOALAN 4

CLO2
C1

- (a) Write the equilibrium constant expression K_c for each of the following heterogeneous systems.

Tuliskan ungkapan berterusan keseimbangan K_c bagi setiap sistem heterogen berikut.

- (i) $(\text{NH}_4)_2\text{Se}_{(s)} \rightleftharpoons 2\text{NH}_{3(g)} + \text{H}_2\text{Se}_{(g)}$
(ii) $\text{AgCl}_{(s)} \rightleftharpoons \text{Ag}^+_{(aq)} + \text{Cl}^-_{(aq)}$
(iii) $\text{P}_{4(s)} + 6\text{Cl}_{2(g)} \rightleftharpoons 4\text{PCl}_{3(l)}$
(iv) $\text{HF}_{(aq)} + \text{H}_2\text{O}_{(l)} \rightleftharpoons \text{H}_3\text{O}^+_{(aq)} + \text{F}^-_{(aq)}$
(v) $\text{CH}_3\text{COOH}_{(aq)} + \text{C}_2\text{H}_5\text{OH}_{(aq)} \rightleftharpoons \text{CH}_3\text{COOC}_2\text{H}_5_{(aq)} + \text{H}_2\text{O}_{(l)}$

[5 marks]

[5 markah]

CLO2
C2

- (b) The equilibrium constant for the dissociation of PCl_5 to form PCl_3 and Cl_2 is 0.04 mol dm^{-3} at 250°C . An equilibrium mixture contains 0.20 mol of PCl_5 and 0.12 mol Cl_2 in a 4000cm^3 container at 250°C . Calculate the mass of PCl_5 in this container.

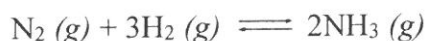
Pemalar keseimbangan bagi penceraian PCl_5 untuk membentuk PCl_3 dan Cl_2 adalah 0.04 mol dm^{-3} pada suhu 250°C . Suatu campuran pada keadaan keseimbangan mengandungi 0.20 mol PCl_5 dan 0.12 mol Cl_2 dalam bekas berisipadu 4000cm^3 pada 250°C . Hitung jisim PCl_5 dalam bekas ini.

[7 marks]

[7 markah]

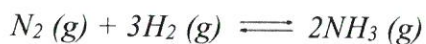
CLO2
C3

- (c) At the start of a reaction, there are 0.249 mol N_2 , $3.21 \times 10^{-2} \text{ mol}$ H_2 , and $6.42 \times 10^{-4} \text{ mol}$ NH_3 in a 3.50 L reaction vessel at 375°C . If the equilibrium constant (K_c) for the reaction



is 1.2 at this temperature, decide whether the system is at equilibrium. If it is not, interpret which way the net reaction will proceed.

Pada permulaan tindak balas, terdapat 0.249 mol N₂, 3.21 x 10⁻² mol H₂, dan 6.42 x 10⁻⁴ mol NH₃ dalam tangki tindak balas berisipadu 3.50 L pada 375 °C. Jika pemalar keseimbangan (K_c) bagi tindak balas



ialah 1.2 pada suhu ini, tentukan sama ada sistem berada dalam keseimbangan.

Jika tidak, tentukan arah anjakan keseimbangan bagi tindak balas tersebut.

[13 marks]

[13 markah]

SOALAN TAMAT