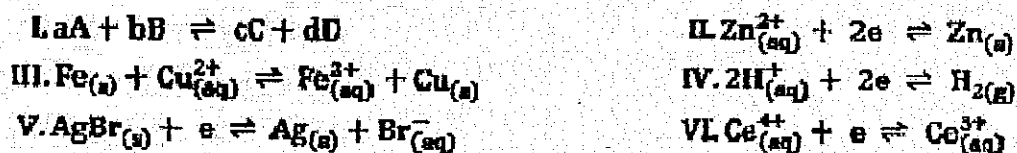


THE OPEN UNIVERSITY OF SRI LANKA
 FOUNDATION PROGRAMME / STAND ALONE COURSE IN SCIENCE
 LEVEL 2 - 2011 / 2012
 CHEMISTRY II -- PSF 2303 / PSE 2303
 HOME ASSIGNMENT II

1.(a) Write down the reversible electrode reactions taking place in each of the following electrodes.

- I. Zinc electrode II. Ferric-Ferrous electrode III. Calomel electrode
 IV. Hydrogen electrode V. Fluorine electrode VI. Silver-Silver Chloride electrode

b) Write down the Nernst equation for the reactions given below.



c) Consider the electrochemical cell comprising an $Al^{3+}_{(aq)}/Al_{(s)}$ electrode and a $Mg^{2+}_{(aq)}/Mg_{(s)}$ electrode. You are provided with following data obtained at 25 °C.

$$E^{\circ}_{Mg^{2+}_{(aq)}/Mg_{(s)}} = -2.37 V \qquad E^{\circ}_{Al^{3+}_{(aq)}/Al_{(s)}} = -0.13 V$$

- I. Giving reasons identify the anode and the cathode.
- II. Calculate the electromotive force at 25°C.
- III. Using the conventional notation write down the above electrochemical cell.
- IV. Write down the half reactions that take place at the anode and the cathode, when a current is drawn from the above electrochemical cell.
- V. Write down the Nernst equation for the cell reaction that takes place.

2. a) Consider the reaction given below.

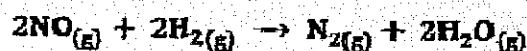


Define the "Rate" of this reaction in terms of the reactant and represent it symbolically.

b) In how many ways can you express the rate of the following reaction? Write down the corresponding expressions and show their inter relationship.



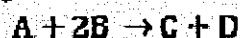
c) The reaction,



Is second order with respect to $NO_{(g)}$ and first order with respect to $H_{2(g)}$.

- I. Write down an expression for rate (R).
- II. If the rate of $\text{NO}_{(g)}$ reacted is $0.2 \text{ mol dm}^{-3} \text{ s}^{-1}$, find the rate of $\text{H}_{2(g)}$ reacted and the rate of $\text{N}_{2(g)}$ formed.
- III. When the concentration of $\text{NO}_{(g)}$ is 2 mol dm^{-3} and the concentration of $\text{H}_{2(g)}$ is 1 mol dm^{-3} , the rate of the reaction is " $r \text{ mol dm}^{-3} \text{ s}^{-1}$ ". Therefore find the rate when the concentration of $\text{NO}_{(g)}$ is 1 mol dm^{-3} and the concentration of $\text{H}_{2(g)}$ is 2 mol dm^{-3} .

d) Consider the reaction given below.

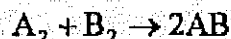


In an experiment to find out the kinetic parameters of the reaction between A and B following readings were obtained.

[A]/mol dm ⁻³	[B]/mol dm ⁻³	Rate/mol dm ⁻³ s ⁻¹
2×10^{-3}	4×10^{-3}	5.7×10^{-7}
2×10^{-3}	8×10^{-3}	11.4×10^{-7}
4×10^{-3}	4×10^{-3}	22.8×10^{-7}

Calculate the orders with respect to A and B and the rate constant of the reaction.

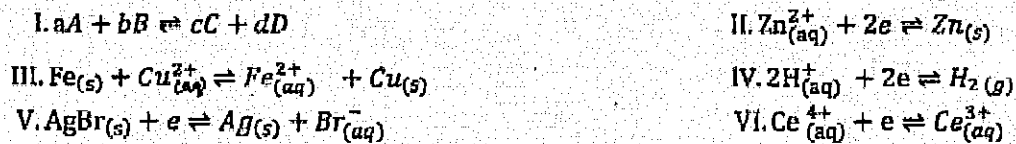
- e) I. Define Dalton's law of partial pressures.
- II. Two gases naming A_2 and B_2 are enclosed in two closed containers with volumes of 0.5 dm^3 and 1.5 dm^3 , respectively. Temperature is 30°C and the pressures of gases are 0.700 atm and 1.20 atm , respectively. Calculate the numbers of moles of gases of A_2 and B_2 separately.
($R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$, $1 \text{ atm} = 1.013 \times 10^5 \text{ Pa}$)
- III. If above A_2 and B_2 gases are mixed in a container with a volume of 1.0 dm^3 at the same temperature,
 - A. Calculate the pressure of the mixture, if the two gases do not react with each other.
 - B. If A_2 and B_2 react according to the reaction given below to form another gas called AB, calculate the partial pressure of each gas in the mixture at the end of the reaction.



ශ්‍රී ලංකා විවෘත විශ්ව විද්‍යාලය
 විද්‍යාචාර්ය පදනම පාඨමාලාව / කනි විද්‍යා පාඨමාලාව
 දෙවන මට්ටම - 2011 / 2012
 රසායන විද්‍යාව II – PSF 2303 / PSE 2303
 පැවැරුම II

1. (a) පහත සඳහන් එක් එක් ඉලෙක්ට්‍රෝඩය අසල සිදුවන ප්‍රතිවර්තන ප්‍රතික්‍රියා ලියා දක්වන්න.
 I. සින්ක් ඉලෙක්ට්‍රෝඩය II. ලෝහ-ලෝහ ඉලෙක්ට්‍රෝඩය III. කැලමල් ඉලෙක්ට්‍රෝඩය
 IV. තහඩුන් ඉලෙක්ට්‍රෝඩය V. ජ්‍යෙෂ්ඨ ඉලෙක්ට්‍රෝඩය VI. සිල්වර් - සිල්වර් ක්ලෝරයිඩ් ඉලෙක්ට්‍රෝඩය

(b) පහත සඳහන් එක් එක් ප්‍රතික්‍රියාව සඳහා තත්ස්ව සමීකරණය ලියා දක්වන්න.

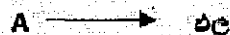


(c) $Al^{3+}_{(aq)} / Al_{(s)}$ ඉලෙක්ට්‍රෝඩයකින් සහ $Mg^{2+}_{(aq)} / Mg_{(s)}$ ඉලෙක්ට්‍රෝඩයකින් සමන්විත වන විද්‍යුත් - රසායනික කෝෂය සලකන්න. 25 °C උෂ්ණත්වයේදී ලබාගත් පහත සඳහන් දත්ත ඔබට ලබා දී ඇත.

$$E^0_{Mg^{2+}_{(aq)}/Mg_{(s)}} = -2.37 V \qquad E^0_{Al^{3+}_{(aq)}/Al_{(s)}} = -0.13 V$$

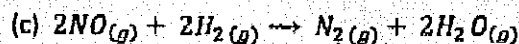
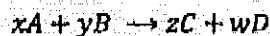
- I. ශක්ති දක්වමින් ඇනෝඩය ලෙස හැසිරෙන ඉලෙක්ට්‍රෝඩය සහ කැතෝඩය ලෙස හැසිරෙන ඉලෙක්ට්‍රෝඩය හඳුනාගන්න
- II. 25 °C දී මෙම කෝෂය සඳහා විද්‍යුත් ගාමක බලය ගණනය කරන්න.
- III. ඉහත සඳහන් විද්‍යුත් රසායනික කෝෂය සඳහා කෝෂ සටහන සම්මත ආකාරයෙන් ලියා දක්වන්න.
- IV. ඉහත සඳහන් විද්‍යුත් රසායනික කෝෂයෙන් ධාරාවක් ලබා ගන්නා විට, ඇනෝඩය සහ කැතෝඩය අසල සිදු වන අර්ධ ප්‍රතික්‍රියා ලියා දක්වන්න.
- V. මෙහිදී සිදු වන කෝෂ ප්‍රතික්‍රියාව සඳහා තත්ස්ව සමීකරණය ලියා දක්වන්න.

2. (a) පහත සඳහන් ප්‍රතික්‍රියාව සලකන්න.



මෙම ප්‍රතික්‍රියාවෙහි සිඝ්‍රතාවය ප්‍රතික්‍රියකයට අනුබද්ධව අර්ථ දක්වන්න. එම සමීකරණය සංශක්තාත්මක ලෙස ලියා දක්වන්න.

(b) පහත සඳහන් ප්‍රතික්‍රියාවෙහි සිඝ්‍රතාවය ලියා දැක්විය හැකි ආකාර ගණන කොපමණද? එම ආකාර සඳහා අදාළ ප්‍රකාශන ලියා දක්වා, එම ප්‍රකාශන අතර සම්බන්ධය ලියන්න.



යන ප්‍රතික්‍රියාව $NO_{(g)}$ ට සාපේක්ෂව දෙවන පෙළ වන අතර $H_{2(g)}$ ට සාපේක්ෂව පළමු පෙළ වේ.

I. එහි සීඝ්‍රතාවය (R) සඳහා ප්‍රකාශනයක් ලියා දක්වන්න.

II. $\text{NO}_{(g)}$ ප්‍රතික්‍රියා කරන සීඝ්‍රතාවය $0.2 \text{ mol dm}^{-3} \text{ s}^{-1}$ වන්නේ නම්, $\text{H}_2_{(g)}$ ප්‍රතික්‍රියා කරන සීඝ්‍රතාවය සහ $\text{N}_2_{(g)}$ ආදීම සීඝ්‍රතාවය ගණනයන්න.

III. $\text{NO}_{(g)}$ හි සාන්ද්‍රණය 2 mol dm^{-3} සහ $\text{H}_2_{(g)}$ හි සාන්ද්‍රණය 1 mol dm^{-3} වන විට ප්‍රතික්‍රියාවේ සීඝ්‍රතාවය $r \text{ mol dm}^{-3} \text{ s}^{-1}$ වන්නේ නම්, $\text{NO}_{(g)}$ හි සාන්ද්‍රණය 1 mol dm^{-3} සහ $\text{H}_2_{(g)}$ හි සාන්ද්‍රණය 2 mol dm^{-3} වන විට ප්‍රතික්‍රියාවේ සීඝ්‍රතාවය ගණනය කරන්න.

(d) පහත සඳහන් ප්‍රතික්‍රියාව සලකන්න.



A සහ B අතර ප්‍රතික්‍රියාවේ වායුමය පදාර්ථයන් නිර්ණය කිරීම සඳහා සිදු කරන ලද පරීක්ෂණයකදී පහත සඳහන් සාධක ලැබුණි.

[A]/ mol dm ⁻³	[B]/ mol dm ⁻³	Rate/ mol dm ⁻³ s ⁻¹
2×10^{-3}	4×10^{-3}	5.7×10^{-7}
2×10^{-3}	8×10^{-3}	11.4×10^{-7}
4×10^{-3}	4×10^{-3}	22.8×10^{-7}

මෙම ප්‍රතික්‍රියාව සඳහා A ට සහ B ට අනුබද්ධව පෙළ සහ සීඝ්‍රතා නියතය ගණනය කරන්න.

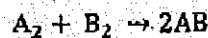
(e) I. ඔබ්ල්ටන්ගේ ආංශික පීඩන නියමය අර්ථ දක්වන්න.

II. A_2 සහ B_2 නම් වායූන් දෙකක් පරිමාව පිළිවෙළින් 0.5 dm^3 සහ 1.5 dm^3 ක් වන සංවෘත බදුන් දෙකක් තුළ ගබඩා කර ඇත. උෂ්ණත්වය 30°C වන අතර වායූන්හි පීඩන පිළිවෙළින් 0.700 atm සහ 1.20 atm වේ. A_2 සහ B_2 නම් වායූන් දෙදෙනෙහි අඩංගු A_2 සහ B_2 වායු මවුල සංඛ්‍යාව පවත වන්නේ ගණනය කරන්න. ($R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$, $1 \text{ atm} = 1.013 \times 10^5 \text{ Pa}$)

III. ඉහත සඳහන් A_2 සහ B_2 වායූන්, පරිමාව 1.0 dm^3 ක් වන බදුන් තුළ එම උෂ්ණත්වයේදීම මිශ්‍ර කළේ නම්,

A. වායූන් එකිනෙක සමග ප්‍රතික්‍රියා නොකරයි නම්, මිශ්‍රණයේ පීඩනය ගණනය කරන්න.

B. ඉහත A_2 සහ B_2 වායූන්, පහත දක්වා ඇති ප්‍රතික්‍රියාවට අනුව ප්‍රතික්‍රියා කොට AB නම් වායුවක් සාදයි නම්, ප්‍රතික්‍රියාව අවසානයේ මිශ්‍රණයේ ඇති එක් එක් වායුවේ ආංශික පීඩන ගණනය කරන්න



உயரநிலைப் பரீட்சை
 அத்தியாயப் பாடநெறி / மட்டம் - 2 - 2011/2012
 கிரையனவியல் II - PSE 2303 / PSE 2303
 விடக் கொடுக்கப்படுகிறது - I

1. (அ) பின்வரும் சமன்பாடுகளை இயல்பில் நிகழும் மீன் - மின்னாவித் தாக்கங்களை எழுதுக.

- (i) தாக்க மின்னாவி (ii) அமில - அமில மின்னாவி (iii) கலவையால் மின்னாவி
 (iv) ஊதரண மின்னாவி (v) ஹைட்ரஜன் மின்னாவி (vi) அமில - அமில இலாபகாரண மின்னாவி

(ஆ) பின்வரும் தாக்கங்களுக்கான சமன்பாட்டினை எழுதுக.

- (i) $aA + bB \rightleftharpoons cC + dD$ (ii) $Zn^{2+}_{(aq)} + 2e \rightleftharpoons Zn_{(s)}$
 (iii) $Fe_{(s)} + Cu^{2+}_{(aq)} \rightleftharpoons Fe^{2+}_{(aq)} + Cu_{(s)}$ (iv) $2H^{+}_{(aq)} + 2e \rightleftharpoons H_{2(g)}$
 (v) $AgBr_{(s)} + e \rightleftharpoons Ag_{(s)} + Br^{-}_{(aq)}$ (vi) $Cr^{4+}_{(aq)} + e \rightleftharpoons Cr^{3+}_{(aq)}$

(ஆ) $Al^{3+}_{(aq)} / Al_{(s)}$ மின்னாவிமீனையும் $Mg^{2+}_{(aq)} / Mg_{(s)}$ மின்னாவிமீனையும் கொண்டு -
 மின்னிரசாயனக் கலவையினைக் கருதுக. $25^{\circ}C$ வெப்பநிலையில்
 மின்னாவித் தரவுகள் தரப்பட்டுள்ளன.

$$E^{\ominus}_{Mg^{2+}/Mg_{(s)}} = -2.37V \quad E^{\ominus}_{Al^{3+}/Al_{(s)}} = -0.13V$$

- (அ) காரணங்களுடன் அனோட்டினையும் கத்தோட்டினையும் சுட்டிக்
 (ii) $25^{\circ}C$ வெப்பநிலையில் மின்னாவிமீனின் மின்னாவிமீனைக் கணிக்கிக்.
 (iii) மேற்படி மின்னிரசாயனக் கலவையின் மின்னாவிமீனைக் கணிக்கிக்.
 (iv) மேற்படி மின்னிரசாயனக் கலவையின் மின்னாவி மின்னாவிமீனைக் கணிக்கிக்.
 அனோட்டினையும் கத்தோட்டினையும் மூலப்படி அனோட்டினைமீனை எழுதுக.
 (v) கலவையின் மின்னாவிமீனை சமன்பாட்டினை எழுதுக.

2. (அ) பின்வரும் தாக்கத்தினைக் கருதுக, $A \rightarrow$ வினைமீன்கள்
 தாக்கத்திதத்திற்கான அனோட்டினைமீனைக் கணிக்கிக், தாக்கத்தின் கத்தோட்டினை
 மின்னாவிமீனைக் கணிக்கிக். அனோட்டினை மின்னாவிமீனை எழுதுக.

(ஆ) கீழ்வரும் தாக்கத்திற்கான தாக்கத்திதத்தினை எழுதுக. கோவைகளில்
 தரலாம்? மேற்படி கோவைகளை எழுதி, அவற்றின் மின்னாவிமீனை
 கத்தோட்டினை மின்னாவிமீனைக் கணிக்கிக்.

$$x A + y B \rightarrow z C + w D.$$

(ஆ) பின்வரும் தாக்கமானது,

$$2 NO_{(g)} + 2 H_{2(g)} \rightarrow N_{2(g)} + 2 H_2O_{(g)}$$

 $NO_{(g)}$ கத்தோட்டினை மின்னாவிமீனை மின்னாவிமீனை, $H_{2(g)}$ கத்தோட்டினை
 மின்னாவிமீனை மின்னாவிமீனைக் கணிக்கிக்.
 (i) தாக்க மின்னாவி (R) மின்னாவி கோவை எழுதுக.

(ii) H_2 இனும் உலோகிய N_2 இனும் தாக்கவிதங்களைத் துணிக்.
 (ii) NO இனும் செறிவு 2 mol dm^{-3} ஆகவும், H_2 இனும் செறிவு 1 mol dm^{-3} ஆகவும் இருக்கும் போது, தாக்கவிதமானது $r \text{ mol dm}^{-3} \text{ s}^{-1}$ ஆயின், NO இன் செறிவு 1 mol dm^{-3} ஆகவும் H_2 இன் செறிவு 2 mol dm^{-3} ஆகவும் இருக்கும் போது, தாக்கவிதத்தினைத் துணிக்.

(d) பின்வரும் தாக்கத்தினைக் கருதுக. $A + 2B \rightarrow C + D$
 A, B க்கிடையான உயக்கவியல் சாரமாதிரிகளை பரிசோதனைநீதியாக கண்டறியப்பட்ட வாசிப்புக்கள் பின்வருமாறு.

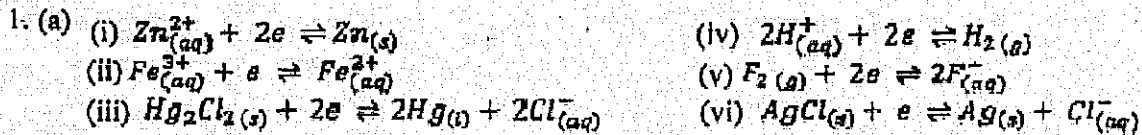
[A] / mol dm ⁻³	[B] / mol dm ⁻³	தாக்கவிதம் / mol dm ⁻³ s ⁻¹
2×10^{-3}	4×10^{-3}	5.7×10^{-7}
2×10^{-3}	8×10^{-3}	11.4×10^{-7}
4×10^{-3}	4×10^{-3}	22.8×10^{-7}

A, B தொடர்பிலான வரிசைகளையும், தாக்கவித மாறிலியையும் கண்டறிக.

(e)
 (i) பகுதியடுக்கம் பற்றிய தூல்தின் விதியை விரிவாக்கிக்.
 (ii) சூடிய தொடர்தியொன்றில் காணப்படும் A_2, B_2 வாயுக்களின் கனவளவுக ளுறைய $0.5 \text{ dm}^3, 1.5 \text{ dm}^3$ வெப்பநிலையானது 30°C ஆகவும் A_2, B_2 வாயுக்களின் அழுக்கங்கள் ளுறைய $0.700 \text{ atm}, 1.20 \text{ atm}$ ஆகக் காணப்படுகின்றது. A_2, B_2 வாயுக்களின் சூல்களைக் கணிக்க. ($R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$, $1 \text{ atm} = 1.013 \times 10^5 \text{ Pa}$)
 (iii) அஃத வெப்பநிலையில் A_2, B_2 வாயுக்களானது 1.0 dm^3 கனவளவுடை தொடர்தியில் கலக்கப்படுமாயின்,
 (A) சமற்படி வாயுக்கள் ஒன்றோடொன்று தாக்கமடையாதாகக் கொண் தொடர்தியின் அழுக்கத்தினைக் கணிக்க.
 (B) சீழ் தரப்பட்டவாறு A_2, B_2 வாயுக்கள் ஒன்றோடொன்று தாக்கமடையுமினைக் கொண்டு; A_2, B_2, AB ஆகிய வாயுக்களின் பகுதியடுக்கங்களைத் துணிக்.



Answer Guide – Home assignment II



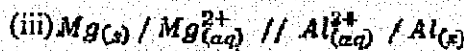
All equations should be in the reduced form. Reversible arrow should be indicated.

(b) (i) $E = E_{C^{+}/C}^{\ominus} - \frac{2.303 RT}{nF} \log_{10} \frac{[C]^a [D]^d}{[A]^a [B]^b}$ (iv) $E = E_{H^{+}/H_2}^{\ominus} - \frac{2.303 RT}{2F} \log_{10} \frac{1}{[H_{(aq)}^{+}]^2}$
 (ii) $E = E_{Zn^{2+}/Zn}^{\ominus} - \frac{2.303 RT}{2F} \log_{10} \frac{1}{[Zn_{(aq)}^{2+}]}$ (v) $E = E_{Ce^{4+}/Ce^{3+}}^{\ominus} - \frac{2.303 RT}{F} \log_{10} [Br_{(aq)}^{-}]$
 (iii) $E = E_{Cu^{2+}/Cu}^{\ominus} - \frac{2.303 RT}{2F} \log_{10} \frac{[Fe_{(aq)}^{2+}]}{[Cu_{(aq)}^{2+}]}$ (vi) $E = E_{Ce^{4+}/Ce^{3+}}^{\ominus} - \frac{2.303 RT}{F} \log_{10} \frac{[Ce_{(aq)}^{3+}]}{[Ce_{(aq)}^{4+}]}$

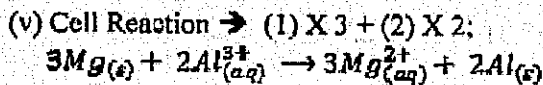
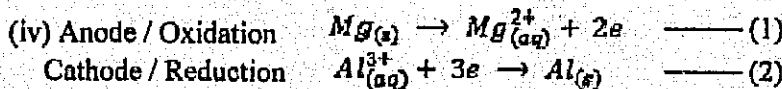
(c) (i) The electrode which has the most negative value for the emf value is the anode and the electrode which has the least negative emf value is the cathode.



(ii) $E_{Cell}^{\ominus} = E_{Cathode}^{\ominus} - E_{Anode}^{\ominus}$
 $= -0.13 \text{ V} - (-2.37 \text{ V}) = 2.24 \text{ V}$



↑
Standard states may be indicated



Nernst Equation

$$E = E_{Cell}^{\ominus} - \frac{2.303 RT}{6F} \log_{10} \frac{[Mg_{(aq)}^{2+}]^3}{[Al_{(aq)}^{3+}]^2}$$

2. (a) Rate = $\frac{\text{Change of concentration of A}}{\text{Time}}$ Or Rate = $\frac{\text{Change of concentration}}{\text{Time taken for the decrease}}$

Or

The change in concentration of A in the reaction with time.

$$R = - \frac{\Delta C_A}{\Delta t}$$

(b) Four ways:

$$-\frac{\Delta C_A}{\Delta t}, -\frac{\Delta C_B}{\Delta t}, -\frac{\Delta C_C}{\Delta t}, -\frac{\Delta C_D}{\Delta t} \quad \text{or} \quad -\frac{1}{x} \frac{\Delta C_A}{\Delta t} = -\frac{1}{y} \frac{\Delta C_B}{\Delta t} = -\frac{1}{z} \frac{\Delta C_C}{\Delta t} = -\frac{1}{w} \frac{\Delta C_D}{\Delta t}$$

(c) (i) $R = k [\text{NO}(g)]^2 [\text{H}_2(g)]$



$$\frac{1}{2} \frac{\Delta[\text{NO}]}{\Delta t} = \frac{1}{2} \frac{\Delta[\text{H}_2]}{\Delta t} = \frac{\Delta[\text{N}_2]}{\Delta t} \quad ; \quad \frac{\Delta[\text{H}_2]}{\Delta t} = 0.2 \text{ mol dm}^{-3} \text{ s}^{-1}$$

$$\frac{\Delta[\text{N}_2]}{\Delta t} = 0.1 \text{ mol dm}^{-3} \text{ s}^{-1}$$

(iii) $r = k 2^2 \times 1$ ---- (1) $a = k 1^2 \times 2$ ---- (2) ; $a = r/2$; a is the rate of second reaction

(d) $R = k [\text{A}]^x [\text{B}]^y$

$5.7 \times 10^{-7} \text{ mol dm}^{-3} \text{ s}^{-1} = k [2 \times 10^{-3} \text{ mol dm}^{-3}]^x [4 \times 10^{-3} \text{ mol dm}^{-3}]^y$ ---- (1)

$11.4 \times 10^{-7} \text{ mol dm}^{-3} \text{ s}^{-1} = k [2 \times 10^{-3} \text{ mol dm}^{-3}]^x [8 \times 10^{-3} \text{ mol dm}^{-3}]^y$ ---- (2)

$22.8 \times 10^{-7} \text{ mol dm}^{-3} \text{ s}^{-1} = k [4 \times 10^{-3} \text{ mol dm}^{-3}]^x [4 \times 10^{-3} \text{ mol dm}^{-3}]^y$ ---- (3)

(1)/(2); $1/2 = (1/2)^y$; $y = 1$

(1)/(3); $1/4 = (1/2)^x$; $x = 2$

So, $R = k [\text{A}]^2 [\text{B}]$

$$k = \frac{R}{[\text{A}]^2 [\text{B}]} = \frac{5.7 \times 10^{-7} \text{ mol dm}^{-3} \text{ s}^{-1}}{[2 \times 10^{-3} \text{ mol dm}^{-3}]^2 [4 \times 10^{-3} \text{ mol dm}^{-3}]} = 35.625 \text{ mol}^{-2} \text{ dm}^6 \text{ s}^{-1}$$

(e) (i) Total pressure of a mixture of gases equals to the sum of partial pressures of each component of the mixture.

(ii) Assuming that the gases behave as ideal gases;

For A_2 ; $PV = nRT$

$n_1 = PV/(RT) = 0.70 \times 1.013 \times 10^5 \text{ Pa} \times 0.5 \times 10^{-3} \text{ m}^3 / (8.314 \text{ J K}^{-1} \text{ mol}^{-1} \times 303 \text{ K}) = 0.014 \text{ mol}$

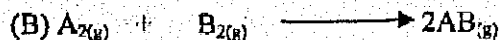
For B_2 ; $PV = nRT$

$n_2 = PV/(RT) = 1.20 \times 1.013 \times 10^5 \text{ Pa} \times 1.5 \times 10^{-3} \text{ m}^3 / (8.314 \text{ J K}^{-1} \text{ mol}^{-1} \times 303 \text{ K}) = 0.072 \text{ mol}$

(iii) (A) $n_{\text{total}} = n_1 + n_2 = (0.014 + 0.072) \text{ mol} = 0.086 \text{ mol}$

$PV = nRT$

$P = 0.086 \text{ mol} \times 8.314 \text{ J K}^{-1} \text{ mol}^{-1} \times 303 \text{ K} / (1.0 \times 10^{-3} \text{ m}^3) = 2.17 \times 10^5 \text{ Pa}$



Initial 0.014 mol 0.072 mol

Reacted 0.014 mol 0.014 mol (2 x 0.014) mol

Final - 0.058 mol 0.028 mol

Total number of moles = (0.058 + 0.028) mol = 0.086 mol

For the mixture; $PV = nRT$; $P = 0.086 \text{ mol} \times 8.314 \text{ J K}^{-1} \text{ mol}^{-1} \times 303 \text{ K} / (1.0 \times 10^{-3} \text{ m}^3) = 2.17 \times 10^5 \text{ Pa}$

Mole fraction of $\text{B}_2 = 0.058 \text{ mol} / 0.086 \text{ mol} = 0.67$

Partial pressure of $\text{B}_2 = 2.17 \times 10^5 \text{ Pa} \times 0.67 = 1.45 \times 10^5 \text{ Pa}$

Mole fraction of AB = 0.028 mol / 0.086 mol or $1 - 0.67 = 0.33$

Partial pressure of AB = $2.17 \times 10^5 \text{ Pa} \times 0.33 = 7.16 \times 10^4 \text{ Pa}$