COMHAD FÍRICÍ:
CEIMIC GCE

FREAGRAÍ AR CHEISTEANNA CHOMHAD FÍRICÍ A2 1

Rewarding Learning

FREAGRAÍ

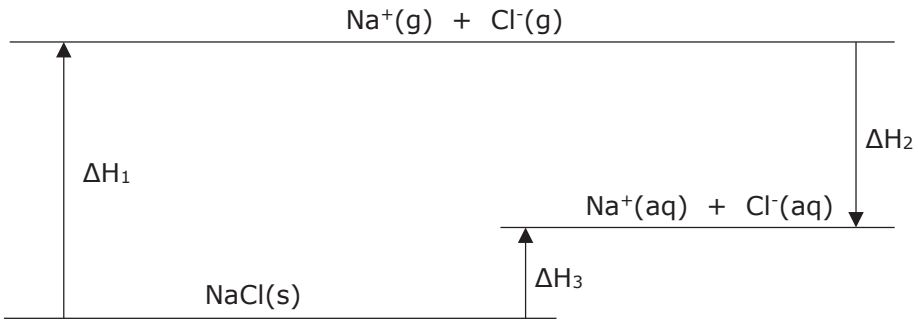
4.1 Eantalpacht laitíse

1. Is é an freagra ná B [1]

2.(i) Eantalpacht laitíse de chlóiríd sóidiam [1]

(ii) Eantalpacht hiodráitiúcháin [1]

(iii)



[-1] do gach earráid [3]

(iv) ΔH_3 = +776 -771 = + 5 kJ [1]

3.(a) E [1]
D [1]
B [1]
A [1]

(b) -(-327.6) + 89.5 + 420 + 106.6 + (-295.4) = + 648.3 kJ mol^{-1}
[-1 do gach earráid] [2]

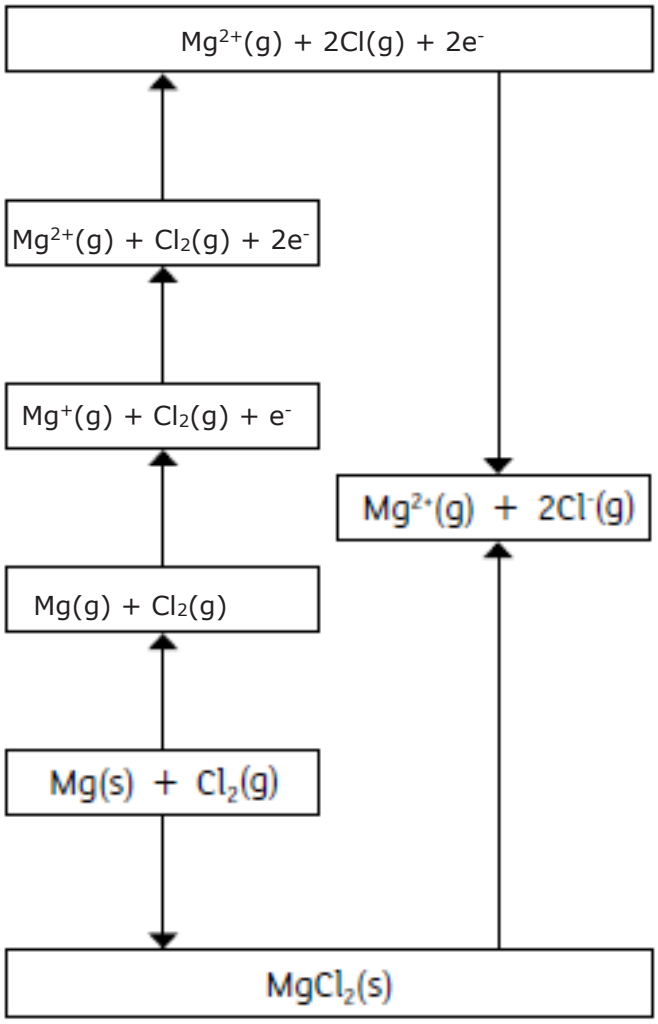
(c) eantalpacht an adamhúcháin/nasc-eantalpacht [1]
an chéad leictreonfhiníocht [1]
eantalpacht foirmithe [1]

(d)(i) $KCl(s) + aq \rightarrow K^+(aq) + Cl^-(aq)$ [2]

(ii) $+710 + (-305) + (-384) = +21$ (kJ mol^{-1}) [2]

(iii) Is é an freagra ná D [1]

4.(a)(i)



[4]

(ii) 2× leictreonfhiníocht =- 2(+121) – (+1450) – (+736) – (+150) + (-642) + (+2493)
2× leictreonfhiníocht = -727
leictreonfhiníocht = -727/2 = -363.5 kJ mol^{-1} [2]

(b) iain mhaignéisiam: $1s^2\ 2s^2\ 2p^6$ [1]
iain chlóiríde: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$ [1]

(c) An t-athrú eantalpachta nuair a thuaslagann aon mhól de thuaslagáit in uisce [1]

4.2 Eantalpacht, eantrópacht agus saorfhuinneamh

1. Is é an freagra ná D [1]

2. Is é an freagra ná B [1]
a = eantrópacht chaighdeánach na gaile uisce
$138 = 2 \times 27 + 3a - (90 + 3 \times 131)$
$138 = 3a - 429$
$3a = 138 + 429 = 567$
$a = 567/3 = 189 \text{ J K}^{-1} \text{ mol}^{-1}$

3. Is é an freagra ná B [1]
$\Delta G = \Delta H - T\Delta S$
$\Delta G = 178 - 298 \times 0.161$
$\Delta G = 130 \text{ kJ mol}^{-1}$

4.(a)
(i) $\Delta H = 3 \times -393.5 - 2 \times -824.2 = +467.9 \text{ kJ mol}^{-1}$ [2]

$\Delta S = 4 \times 27.3 + 3 \times 213.6 - (2 \times 87.4 + 3 \times 5.7) = +558.1 \text{ J K}^{-1} \text{ mol}^{-1}$ [2]

$\Delta G = \Delta H - T\Delta S = 467.9 - 298 \times 0.5581 = +301.6 \text{ kJ mol}^{-1}$ [2]

(ii) tá ΔG deimhneach [1]

(b) $T = \frac{\Delta H}{\Delta S} = \frac{467.9}{0.5581} = 838.4 \text{ K}$ [2]

5.(i) $NH_4NO_3 \rightarrow N_2O + 2H_2O$ [1]

(ii) Tá ΔG diúltach ag gach teocht [1]

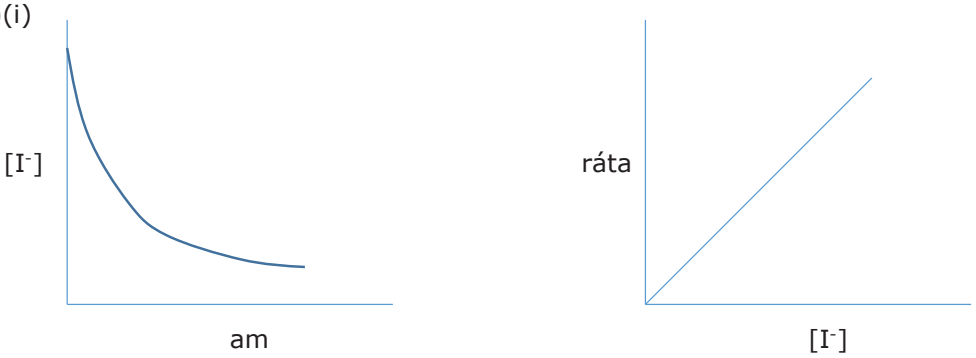
6. Is é an freagra ná D [1]
$T = \frac{\Delta H}{\Delta S} = \frac{237}{0.190} = 1247.4 \text{ K}$

4.3 Rátaí

1. Is é an freagra ná A [1]

2.(a) stáirse [1]
gormdhubh [1]

(b)(i)



[2]

(ii) ord H_2O_2 = 1 [1]
ord H^+ = nialas [1]

(ii) ráta = $k[H_2O_2][I^-]$ nó ráta = $k[H_2O_2][I^-][H^+]^0$ [1]

(iv) $2.1 \times 10^{-6} = k(0.00075)(0.1)$
$k = 0.028$ mol^{-1} dm^3 s^{-1} [1]

(c)(i) céim is moille san imoibriúchán [1]

(ii) $IO^- + 2H^+ + I^- \rightarrow H_2O + I_2$ [2]

3.(i) samplaí a thógáil ag eatraimh ama shocraithe agus an meascán imoibriúcháin a mhúchadh/uisce a chur leis (le stop a chur leis an imoibriúchán) [1]
Ceachtar acu
Toirtmheasc in aghaidh $Na_2S_2O_3(aq)$ caighdeánach
nó Cuir $AgNO_3(aq)$ leis agus faigh meáchan an deascáin
nó Dathmhéadracht do I_2 [1]

breac graf de $[I-]/[I_2]$ in aghaidh ama [1]
an grádán a thomhas le ráta a aimsiú [1]

uasmharc [3]

Caighdeán na Cumarsáide Scríofa [2]

(ii) ord i dtaca le $S_2O_8^{2-}$ = 1
ord i dtaca le I^- = 1 [2]

(iii) ráta = $k[S_2O_8^{2-}][I^-]$ [2]

(iv) is é an t-ord foriomlán ná suim na n-ord = 1 + 1 = 2 [1]

(v) $0.18 = k(0.05)^2$
$k = 0.18/0.05^2 = 72$ mol^{-1} dm^3 s^{-1} [2]

4.4 Cothromaíocht

1.(i) $K_c = \dfrac{[CH_3COOC_5H_{11}][H_2O]}{[CH_3COOH][C_5H_{11}OH]}$ [1]

(ii) g a thiontú ina mhóil

	$C_5H_{11}OH$	+ CH_3COOH	⇌ $CH_3COOC_5H_{11}$	+ H_2O
móil tosaigh	0.0125	0.02	0	0
móil chothromaíochta	0.0025	0.01	0.01	0.01

$K_c = \dfrac{[CH_3COOC_5H_{11}][H_2O]}{[CH_3COOH][C_5H_{11}OH]} = \dfrac{0.01 \times 0.01}{0.01 \times 0.0025} = 4$ [4]

2. Is é an freagra ná B [1]

3. móil de NH_3 a imoibríonn = móil de CH_4 a imoibríonn = 0.1 mol
móil de NH_3 ar cothromaíocht = 0.2 – 0.1 = 0.1 mol
móil de CH_4 ar cothromaíocht = 0.2 – 0.1 = 0.1 mol
$K_c = \dfrac{[HCN][H_2]^3}{[NH_3][CH_4]} = \dfrac{(0.1)(0.3)^3}{(0.1)(0.1)} = 0.27\ mol^2\ dm^{-6}$ [3]

4. Is é an freagra ná C [1]
$K_c = \dfrac{[CH_3CH_2COOCH_3][H_2O]}{[CH_3CH_2COOH][CH_3OH]} = \dfrac{(0.5)(2.5)}{(0.5)(0.5)} = 5$

4.5 Cothromaíochtaí aigéad-bunanna

1. Is é an freagra ná A [1]
$pH = - \log_{10}[H^+] = - \log_{10}(0.1) = 1$

2. Is é an freagra ná B [1]

3. Is é an freagra ná C [1]

4.(a) $K_a = 10^{(-2.9)} = 1.259 \times 10^{-3}$ mol dm^{-3}
$[H^+] = \sqrt{K_a \times [\text{aigéad}]} = \sqrt{1.259 \times 10^{-3} \times 0.1} = 0.0112$ mol dm^{-3}
$pH = - \log_{10}[H^+] = - \log_{10}(0.0112) = 1.95$ [3]

(b) feanóltailéin [1]
athruithe datha sa raon pH atá ag comhfhreagairt don chuid cheartingearach den chuar toirmheasctha [1]

(c) $C_4H_6O_6 + OH^- \rightarrow C_4H_5O_6^- + H_2O$ [1]
$C_4H_5O_6^- + H^+ \rightarrow C_4H_6O_6$ [1]

5. ar aigéad/ H^+ a chur leis comhcheanglaíonn iain eatánóáite leis an H^+ [1]
$CH_3COO^- + H^+ \rightarrow CH_3COOH$ [1]
ar alcaile a chur leis/OH^- imoibríonn aigéad eatánóch le OH^- a bhaint ar shiúl [1]
$CH_3COOH + OH^- \rightarrow CH_3COO^- + H_2O$ [1]

6. móil de MgO = $\frac{0.0006}{24} = 2.5 \times 10^{-5}$ mol
móil de $OH^- = 2.5 \times 10^{-5} \times 2 = 5 \times 10^{-5}$ mol
$[OH^-] = 5 \times 10^{-5} \times 10 = 5 \times 10^{-4}$ mol dm^{-3}
$K_w = [H^+][OH^-] = 1 \times 10^{-14}$
$[H^+] = \frac{1 \times 10^{-14}}{5 \times 10^{-4}} = 2 \times 10^{-11}$ mol dm^{-3}
$pH = - \log_{10}[H^+] = - \log_{10}(2 \times 10^{-11}) = 10.7$ [3]

7. Is é an freagra ná C [1]
móil de HCl = $\frac{500 \times 0.4}{1000} = 0.2$ mol
móil de NaOH = $\frac{500 \times 0.1}{1000} = 0.05$ mol
móil de HCl fágtha = 0.2 – 0.05 = 0.15 mol in 1000 cm^3
$[HCl] = 0.15$ mol dm^{-3} mar sin de $[H^+] = 0.15$ mol dm^{-3}
$pH = - \log_{10}[H^+] = - \log_{10}(0.15) = 0.82$

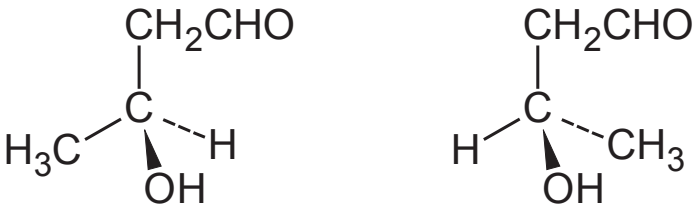
4.6 Isiméireacht

1. Is é an freagra ná A [1]

2. Is é an freagra ná A [1]

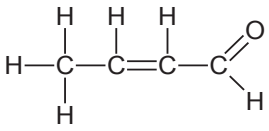
3.(i) rothlaíonn plána [1] an tsolais phlánpholaraithe [1]

(ii)



[2]

(iii)

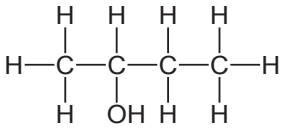


[1]

4.(a) is adamh é lár neamhshiméadrach a bhfuil ceithre adamh nó ghrúpa dhifriúla ceangailte de [1]

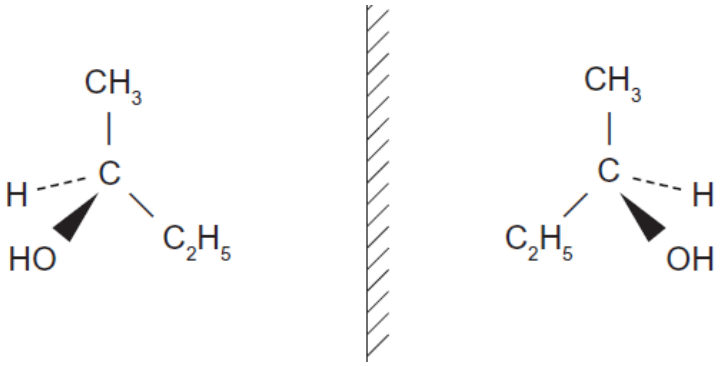
(b) is isiméirí iad isiméirí optúla atá ann mar íomhánna scáthánacha [1]
do-fhorshuite [1]

(c)



[1]

(d)



[2]

(e) solas plánpholaraithe [1]
rothlaithe i dtreonna urchomhaireacha [1]

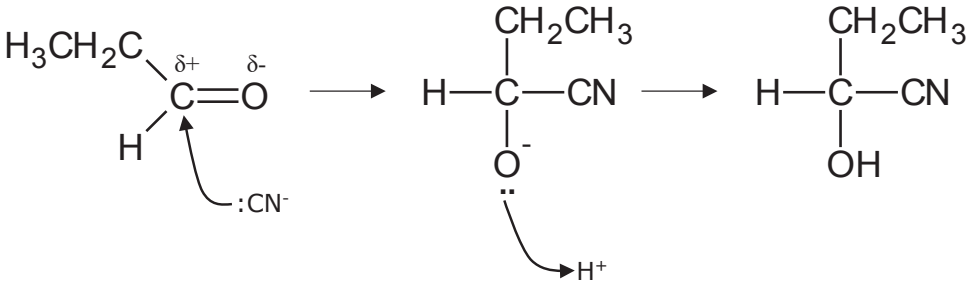
4.7 Aildéid agus Céatóin

1. Is é an freagra ná C [1]

2. Is é an freagra ná C [1]

3.(a) eatánal [1] carbóinil [1]

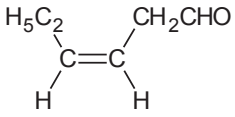
(b) suimiúchán núicléifileach [1]



[3]

(c) CN^- ionsaíonn sé ar dhá thaobh an phlána C=O [1]
meascán cothrom den dá isiméir optúla [1]

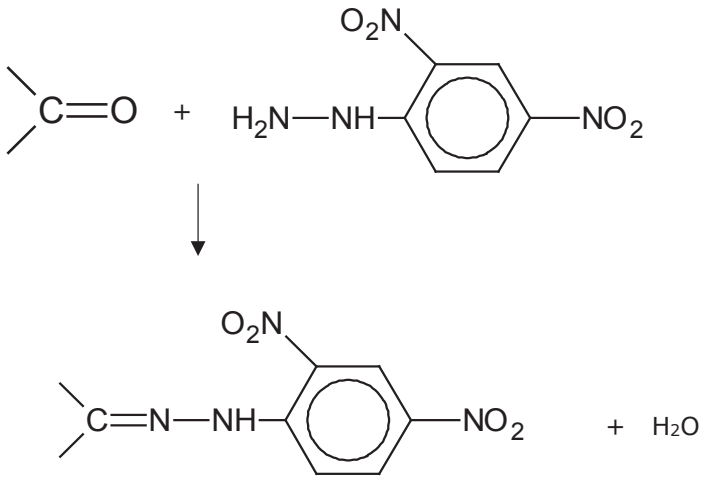
4.(a)



[2]

(b) tuaslagán gorm [1] athraíonn sé le deascán dearg a thabhairt [1]

(c)



[3]

4.8 Aigéid charbocsaileacha

1. Is é an freagra ná D [1]

2.(a) $C_6H_{12}O$ [1]

(b) –COOH/ foirmíonn aigéad eatánóch H-naisc [1]
foirmíodh idir H de H_2O (nó H de COOH) agus O de COOH (nó O de H_2O) [1]
tá slabhra hidreafóbach/fada ag aigéad lárach [1]

(c) cuir carbónáit/hidrigincharbónáit le haigéad leachtach lárach [1]
giosáil/tástáil do CO_2 [1]

(d) $C_{11}H_{23}COOH + PCl_5 \rightarrow C_{11}H_{23}COCl + POCl_3 + HCl$ [2]

(e)(i) $C_{11}H_{23}COOH + 4[H] \rightarrow C_{11}H_{23}CH_2OH + H_2O$ [2]

(ii) teitrihidríodalúmanáit litiam(III)/HAL [1]

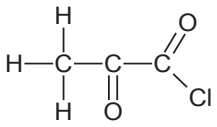
3.(a) $2CH_3CH_2COOH + Mg \rightarrow (CH_3CH_2COO)_2Mg + H_2$ [1]

$2HCOOH + Na_2CO_3 \rightarrow 2HCOONa + H_2O + CO_2$ [1]

$CH_3CH_2CH_2COOH + KOH \rightarrow CH_3CH_2CH_2COOK + H_2O$ [1]

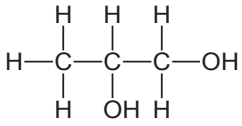
(b)

le PCl_5



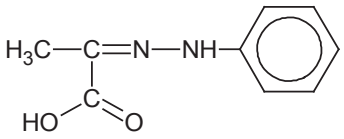
[1]

le farasbarr $LiAlH_4$



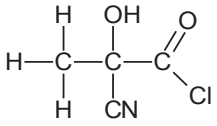
[1]

le $H_2NNHC_6H_4$ (feinilhiodraisín)



[1]

le HCN



[1]

4.9 Díorthaigh na n-aigéad carbocsaileach

1. Is é an freagra ná B [1]

móil de bhútán-1-ól = $\frac{6.0}{74}$ = 0.0811 mol

táirgeacht theoiriciúil d'eistear ($CH_3CH_2COOC_4H_9$) = 0.0811 × 130 =10.54 g

táirgeacht chéatadánach = $\frac{7.4}{10.54} \times 100$ = 70.2 % = 70%

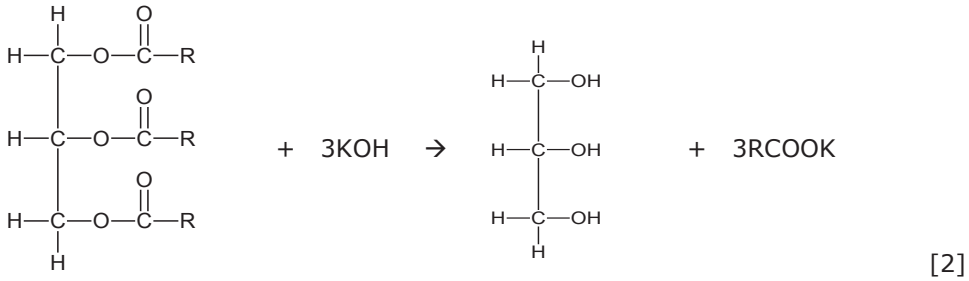
2.(i) $CH_3CH_2COOH + CH_3OH \rightleftharpoons CH_3CH_2COOCH_3 + H_2O$ [1]

(ii) catalaíoch/méadaíonn táirgeacht/brúnn suíomh na cothromaíochta ar dheis/ionsúnn uisce [1]

(iii) naisc hidrigine idir móilíní aigéad própánóch
gan naisc hidrigine/VDW amháin/buanaomacháin déphol-déphoil idir móilíní própánóáit mheitile [1]
trácht ar neart coibhneasta nasctha, mar shampla naisc hidrigine níos láidre ná VDW/buanaomadh déphol-déphol [1]

(iv) **dhá cheann** ar bith as:
táirgeacht níos airde/neamh-inchúlaithe [1]
níos gasta [1]
táirge gásach eile [1]

3.(a)
(i)



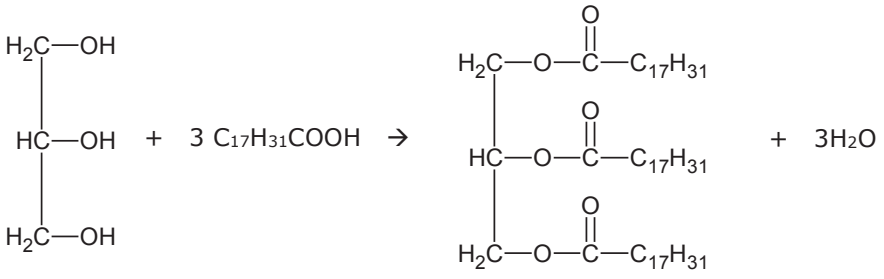
[2]

(ii) própán-1,2,3-tríol [1]

(b)(i) $C_{19}H_{38}O_2$ [1]

(ii) $2C_{19}H_{38}O_2 + 55O_2 \rightarrow 38CO_2 + 38H_2O$ [2]

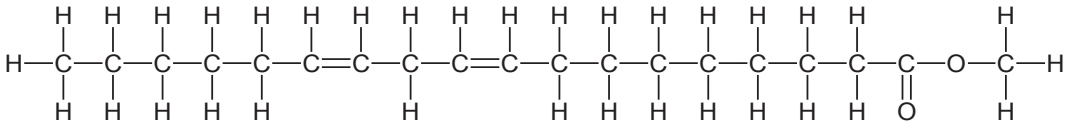
4.(a)



[2]

(b) tá C=C in aigéid shailleacha [1]

(c)



[2]

4.10 Ceimic aramatach

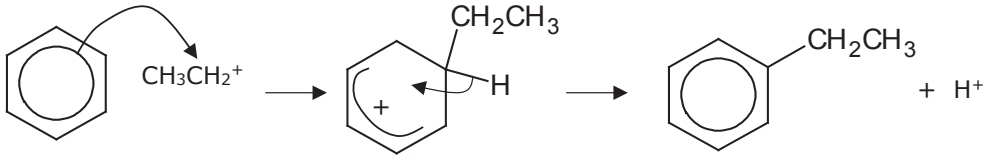
1. Is é an freagra ná C [1]

2.(a) clóiríd alúmanaim [1]

(b) $CH_3CH_2Cl + AlCl_3 \rightarrow AlCl_4^- + CH_3CH_2^+$ [2]

(c) $C_6H_6 + CH_3CH_2Cl + C_6H_5CH_2CH_3 + HCl$ [1]
eitilbeinséin [1]

(d)

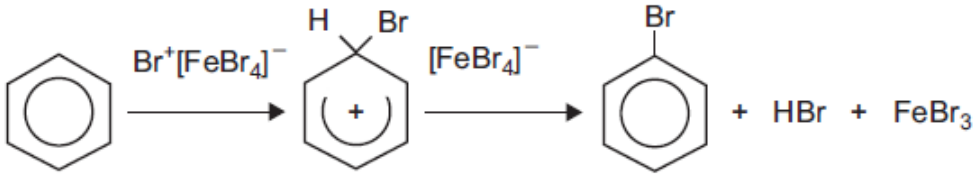


[3]

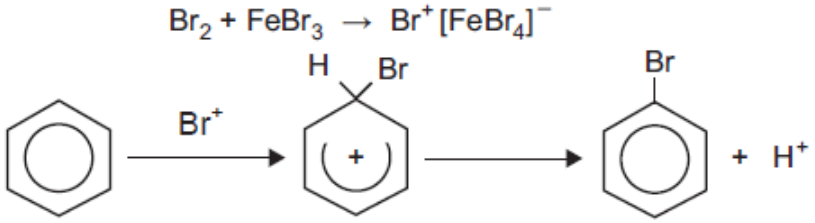
3.(a)
(i) suimiúchán leictrifileach [1]

(ii) iarann nó bróimíd iarainn(III) [1]

(iii)



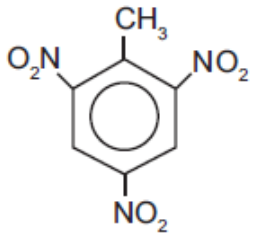
nó



([-1] do gach meancóg) [3]

(iv) malartú leictrifileach [1]

(b)(i)



[1]

(ii) aigéad nítreach tiubhaithe agus aigéad sulfarach tiubhaithe [1]
$HNO_3 + 2H_2SO_4 \rightarrow NO_2^+ + 2HSO_4^- + H_3O^+$ [1]

4. Is é an freagra ná B [1]