

北京化工大学  
2019-2020-2 学期期末考试答卷

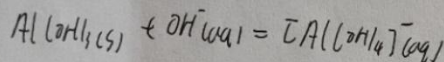
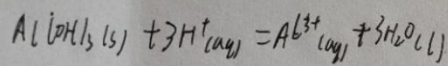
课程名称: 无机化学 课程代码: CHM11200 任课教师: Guthier Rosine

姓名: 李自洋 学号: 201804070 班级: 149A1804

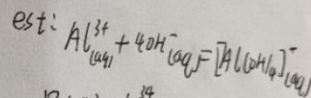
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答卷内容 (注: 写清题号, 只写答案)

1. ① la définition d'une espèce amphotère  
acido-basique qui peut produire ~~est~~ jouer  
à la fois acide ou base:



④: la réaction de formation globale



$$\beta(4) = 10^{34}$$

2: 1:  $Al^{3+}$  ( $pH \leq 4$ ) 2:  $Al(OH)_3$  ( $4 < pH < 10$ ) 5: pour 3 et 4

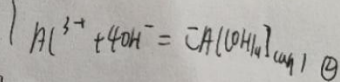
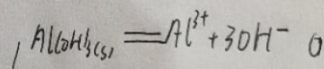
3:  $[Al(OH)_4]^-(pH \geq 10)$  4:  $Al(s)$

on a:

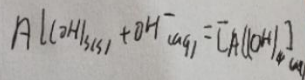
si  $pH \leq 4$   $Al^{3+}$  est prédomine

$4 < pH < 10$   $Al(OH)_3$  est prédomine

$pH \geq 10$ :  $[Al(OH)_4]^-$  est prédomine



(1) + (2):

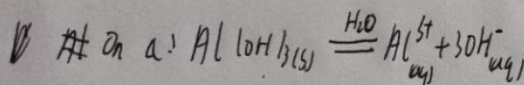


$$K = K_g \times \beta(4) = 10^{-2}$$

$$[Al(OH)_4] = 10^{-2}$$

3:  $pH = 4$  donc:  $[H^+] = 10^{-4} \text{ mol/L}$

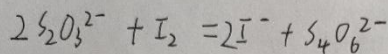
$$T = 25^\circ \quad K_e = 10^{-14} \quad \text{donc: } [OH^-] = \frac{K_e}{[H^+]} = 10^{-10} \text{ mol/L}$$



$$K_s = [Al^{3+}] \cdot [OH^-]^3 \quad [Al^{3+}]_{\text{max}} \text{ est } 10^{-2} \text{ mol/L}$$

$$K_g = 10^{-2} \times 10^{-30} = 10^{-32}$$

$$5: E^{\circ}(I_2/I^-) = 0.62V > E^{\circ}(S_4O_6^{2-}/S_2O_3^{2-}) = 0.08V$$



2.2: On a 20 ml de solution d'ion cuivrique.

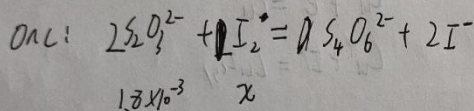
$$6: [S_2O_3^{2-}] = 1 \times 10^{-1} \text{ mol/L} \quad V_{(S_2O_3^{2-})} = 18.0 \text{ ml}$$

$$n_{(S_2O_3^{2-})} = [S_2O_3^{2-}] \cdot V = 1 \times 10^{-1} \text{ mol/L}$$

$$2.2: 6: [N_2S_2O_3] = 1 \times 10^{-1} \text{ mol/L} = [S_2O_3^{2-}]$$

$$V_{(S_2O_3^{2-})} = 18 \text{ ml}$$

$$n_{(S_2O_3^{2-})} = [S_2O_3^{2-}] \cdot V_{(S_2O_3^{2-})} = 1 \times 10^{-1} \times 18 \times 10^{-3} = 1.8 \times 10^{-3} \text{ mol}$$



$$\frac{2S_2O_3^{2-}}{I_2} = \frac{1.8 \times 10^{-3} \text{ mol}}{x}$$

$$x = 9 \times 10^{-4} \text{ mol}$$

$$x = n(I_2) = 9 \times 10^{-4} \text{ mol}$$

$$[I^-] = 2 \times 10^{-1} \text{ mol/L} \quad V_{(I^-)} = 50 \text{ ml}$$

$$n(I^-) = 2n(I_2) + n(CuI) = [I^-] \cdot V_{(I^-)}$$

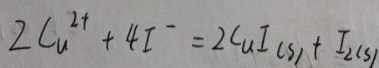
$$= 2 \times 10^{-1} \times 50 \times 10^{-3}$$

$$= 1 \times 10^{-2} \text{ mol}$$

$$n(CuI) = n(I^-) - 2n(I_2)$$

$$= 1 \times 10^{-2} - 1.8 \times 10^{-3}$$

$$= 8.2 \times 10^{-3} \text{ mol}$$



$$n(Cu^{2+}) = n(CuI) = 8.2 \times 10^{-3} \text{ mol}$$

$$\text{donc: } [Cu^{2+}] = \frac{n(Cu^{2+})}{V} = \frac{8.2 \times 10^{-3}}{20 \times 10^{-3}} = 4.1 \times 10^{-1} \text{ mol/L}$$

$$V = 20 \text{ ml}$$

2.2: 7: Après ajout de la solution de thiosulfate de sodium, ajouter la solution  $AgNO_3$ , si il ~~se~~ précipitation jaune ( $Ag^+ + I^- = AgI(s)$  (jaune)), le système est bien en excès d'ions iodure.

2.2: 8: Ajouter la solution amidon dans la solution pré-titrage, la solution est bleue, l'ajout de la solution de thiosulfate de sodium ( $I_2 + 2S_2O_3^{2-} = 2I^- + S_4O_6^{2-}$ ) le bleu disparaît.

La concentration de la solution d'ion cuivrique est:  $4.1 \times 10^{-1} \text{ mol/L}$

(3)



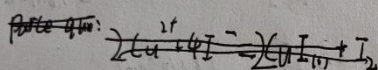
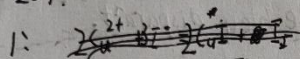
课程名称: 无机化学 课程代码: CHM11200T 任课教师: Gathier Roisine

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答卷内容 (注: 写清题号, 只写答案)

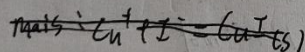
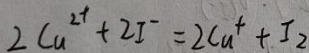
2: 2.1!



Parce que:  $E^\circ(\text{Cu}^{2+}/\text{Cu}^+) = 0.17\text{V} <$

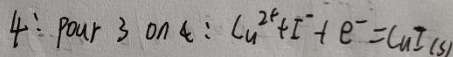
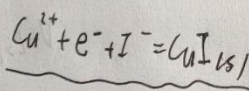
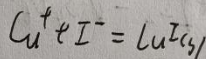
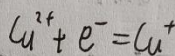
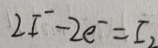
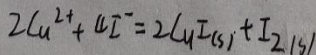
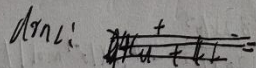
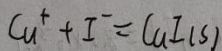
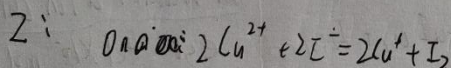
$E^\circ(\text{I}_2/\text{I}^-) = 0.62\text{V}$   ~~$E^\circ(\text{Cu}^{2+}/\text{CuI}) = 0.84\text{V}$~~

donc il y a réaction  
peu



~~$\text{Cu}^{2+}$  est oxydoreducteur.~~

donc: on tenant compte que  
des réaction d'oxydoreduction.



$E^\circ(\text{Cu}^{2+}/\text{CuI}) = E^\circ(\text{Cu}^{2+}/\text{Cu}^+) - \frac{0.06}{1} \times \log K_{sp}(\text{CuI})$

$= 0.17 - \frac{0.06}{1} \times \log(10^{-12})$

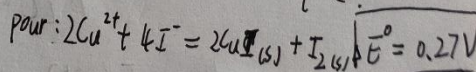
$= 0.17 + 0.72$

$= 0.89\text{V}$

~~$0.84\text{V}$~~

$0.89\text{V} > E^\circ(\text{I}_2/\text{I}^-) = 0.62\text{V}$

Il est suit pour un titrage  
de ions cuivre.



$K^\circ = \frac{1}{10^{\frac{0.06}{2} \times 0.27}} = 10^{\frac{2}{0.06} \times 0.27}$

$K^\circ = 10^9$   $= 10^4$  (2)