

Name: \_\_\_\_\_

الرجاء كتابة الاسم رباعيا بالعربية

Q 1	Q 2	Q 3	Q 4	Bonus	Total
30	10	10	10	10	60

The answers of MCQ part should be given in the following answer sheet:

No.						No.					
1	a	b	c	d	e	11	a	b	c	d	e
2	a	b	c	d	e	12	a	b	c	d	e
3	a	b	c	d	e	13	a	b	c	d	e
4	a	b	c	d	e	14	a	b	c	d	e
5	a	b	c	d	e	15	a	b	c	d	e
6	a	b	c	d	e	16*	a	b	c	d	e
7	a	b	c	d	e	17*	a	b	c	d	e
8	a	b	c	d	e	18*	a	b	c	d	e
9	a	b	c	d	e	19*	a	b	c	d	e
10	a	b	c	d	e	20*	a	b	c	d	e

\*: Calculations are asked



[I] Select the correct answer of the following: Explain calculation 16-20:

1. If 0.02 mol HBr is added to 200 ml 0.1M  $\text{NH}_3$  ( $K_b = 1.7 \times 10^{-5}$ ), what is correct:  
(a)  $\text{pOH} = \text{pK}_b$       (b)  $\text{pH} < 7$       (c)  $\text{pH} > 7$       (d)  $\text{pH} = \text{pOH} = 7$       (e) None

2. An initial pH of 1.00, an equivalence point at pH 7.0, and a relatively long, nearly vertical middle section corresponds to a titration curve for \_\_\_\_\_.  
(a) Strong acid titrated by strong base.  
(b) Strong base titrated by strong acid.  
(c) Weak acid titrated by strong acid.  
(d) Weak base titrated by strong acid.  
(e) Weak base titrated by weak acid.

3. Which of the following is not a precipitating agent:

- (a) Thioacetamide.      (b) Na tetraphenylboron.  
(c)  $\text{AgNO}_3$       (d) Dimethylsulfate.  
(e) Ammonium thiocyanate.

4. Which of the following is not an indicator for redox titration:

- (a) Starch      (b) Color of  $\text{I}_2$       (c) Ferroin      (d) KSCN      (e) None

5. The following have an acidic PH when equal volumes are mixed except:

- (a)  $\text{HNO}_2$  (0.06 M) /  $\text{NaOH}$  (0.06 M)      (b)  $\text{H}_2\text{O}$  /  $\text{HBr}$  (0.06 M)  
(c)  $\text{HCOOH}$  (0.06 M) /  $\text{HF}$  (0.06 M)      (d) Pyridine (0.6 M) /  $\text{HClO}_4$  (0.6 M)  
(e) None of the above

6. Which of the following is amphoteric?

- (a)  $\text{NaBr}$       (b)  $\text{KI}$       (c)  $\text{BaCl}_2$       (d)  $\text{NaHCO}_3$       (e)  $\text{Na}_2\text{C}_2\text{O}_4$

7. Regarding a redox titration what is incorrect:

- (a) Iodine is used directly as a titrant in iodimetry.  
(b)  $\text{Ce(III)}$  sulfate is used as an oxidizing agent in cerimetry.  
(c) Nitritometry is used to determine benzocaine.  
(d) Karl Fischer reagent contains  $\text{SO}_2$  and  $\text{I}_2$  in organic solvent  
(e) Iodate and  $\text{ClO}_3^-$  analyzed per iodometry.

8. If  $\text{pK}_a = 9.2$  of chlorpromazine hydrochloride, what is wrong:

- (a) The salt is acidic.  
(b) Dissolve in water to give chloride ion.  
(c) At pH 11.2 the ratio of  $[\text{B}] / [\text{BH}^+] = 100$ .  
(d) When titrated with  $\text{NaOH}$  a buffer is formed pre-equivalence point



(e) When titrated with NaOH pH < 7 at equivalence point.

9. Regarding Fajan's method what are correct:

- (a) Indirect titration using  $\text{AgNO}_3$  in excess to analyte.
- (b) Pre-eq. p. affinity to adsorb analyte is higher than indicator.
- (c) End point is detected by formation of coloured solution.
- (d) Fluoresceinate anion is indicator adsorbed in counter ion layer post eq.p.
- (e)  $\text{SCN}^-$  is the titrant.

10. Regarding kjeldhal's method, what is wrong:

- (a) It depends on acid base titration.
- (b) It is applied to determine nitrogen in proteins and inorganic substances.
- (c)  $\text{NH}_3$  liberated is collected in a previously weighed adsorption media.
- (d) The organic substance is destroyed by boiling with  $\text{H}_2\text{SO}_4$ .
- (e) Back titration is performed with NaOH.

11. When Cu (II) ion is analyzed by redox titration, what is correct:

- (a) Titrate with oxidizing agent like  $\text{I}_2$ .
- (b) Use Ce (IV) as titrant and ferroin as indicator.
- (c) KI is added in excess followed by titration with  $\text{S}_2\text{O}_3^{2-}$ .
- (d) Starch as indicator shows end point when the color is blue.
- (e) None of the above.

12. What is wrong about nitritometry:

- (a) It is called diazotitration.
- (b) KBr and acid are added before titration.
- (c) During titration nitrite ion oxidizes  $1^\circ$  aromatic amine
- (d) Sodium nitrite standard solution is the titrant
- (e) Ice bath is needed during titration.

13. Regarding precipitation titration, what is correct:

- (a) Excess  $\text{Ag}^+$  is back titrated with  $\text{NH}_4\text{Cl}$  in volhard's method.
- (b) Strongly acidify with  $\text{HNO}_3$  is advised in Moher's method.
- (c) Fe(III)chloride is indicator of choice in volhard's method.
- (d)  $\text{Cl}^-$  ion is precipitated with excess  $\text{Ag}^+$  and filtered before backtitration.
- (e) The end point is a colored solution in Moher's method.

14. Regarding EDTA titration techniques, which is incorrect:

- (a) ErichromblackT color changes to wein red when complexes with cation.
- (b)  $[\text{MgY}]^{2-}$  is added to analyte cation and EDTA is liberated.
- (c)  $\text{Cu}^{+2}$  blocks erichromblack T so indirect titration is advised.
- (d) To  $\text{Ag}^+$   $[\text{Ni}(\text{CN})_4]^{2-}$  is added and  $\text{Ni}^{+2}$  is displaced.
- (e)  $\text{CN}^-$  forms a stable complex with  $\text{Ni}^{+2}$  which does not interfere with EDTA.



15. Regarding complexometry what is wrong:
- (a) EDTA is a chelating agent forms tetrahedral complex.
  - (b)  $\text{Na}_2\text{H}_2\text{Y}$  is used as titrant.
  - (c) EDTA reacts with cations 1:1.
  - (d) BAL is used to mask  $\text{pb}^{+2}$ .
  - (e) Ammonia buffer is required in EDTA titration.

16. If titration of 50 ml metamizol sodium, 20 ml, 0.5 N  $\text{I}_2$  were consumed then molar concentration of metamizol is:
- (a) 0.5                      (b) 0.25                      (c) 0.1                      (d) 0.05                      (e) 0.025

17. What is **ppm** of  $\text{Ag}^+$  (AM=107.86) in 0.5 L if it gives 0.148 g  $\text{Ag}_3\text{PO}_4$  (MW = 418.58):
- (a) 109                      (b) 540                      (c) 229                      (d) 240                      (e) 85

18. If 0.04 mol HCl gas passed in 100 ml, 0.2 M  $\text{NH}_3$  ( $K_b=1.7 \times 10^{-5}$ ), what is correct:  
(a)  $\text{pH} < 7$       (b)  $\text{pH} > 7$       (c)  $\text{pH} = \text{p}K_a$       (d)  $\text{pH} = \text{pOH} = 7$       (e) None

19. If  $\text{H}_3\text{PO}_4$  (MW=97.99), 85.5% w/w, sp.gr. 1.71, the molar concentration is:  
(a) 14.8      (b) 10.5      (c) 8.48      (d) 21.0      (e) None

20. What is molarity of sulphate if  $[\text{BaY}]^{-2}$  was added to (50 ml) sulphate to precipitate as  $\text{BaSO}_4$ . The liberated edta required titration with 20 ml, 0.02 M  $\text{MgCl}_2$  solution:  
(a) 0.8      (b) 0.008      (c) 0.1      (d) 0.01      (e) None

[II] a. Explain using example steps of bromatometry?

b. A polluted water sample (1 L) with an insecticides sodium arsenite  $\text{Na}_3\text{AsO}_3$  (FW=191.88) was analysed as follows: 1.0 ml was diluted in 100 ml volumetric flask. 25 ml of the resulting solution were diluted in 50 ml. 15 ml of the solution were further diluted to 200 ml. 100 ml of the end solution were acidified and 5.2 ml, 0.015 M  $\text{KIO}_3$  and KI in excess were added. After 15 min. the unreacted iodine  $\text{I}_2$  was titrated with 8.7 ml, 0.05 M thiosulfate solution. **Write balance equations involved in the analysis and calculate the molar and ppm concentration of  $\text{Na}_3\text{AsO}_3$  in the sample?**



[III] a. Mention conditions of Mohr's method (pH, indicator, end point)?

b. A ten tablet sample of Ciprofloxacin.HCl ( $C_{17}H_{18}FN_3O_3 \cdot HCl$ , MW = 367.80) were pulverized and dissolved in 500 ml. To 50ml aliquot 17.5 mL, 0.15 M  $AgNO_3$  was added. The precipitate was filtered washed and the combined filtrate and washings were diluted in 100 ml. Titration of 50 ml of the resulting solution required 5.1 mL, 0.12M of KSCN. **Calculate** average weight of  $C_{17}H_{18}FN_3O_3 \cdot HCl$  per tablet? **What** is the name of titration and **how** to detect end point?

**[IV] a. Explain** masking technique in EDTA titration with an example?



b. A 1.022 g calamine powder, which consists of zinc and iron oxides, was dissolved in acid and diluted to 250 ml. Potassium fluoride was added to 10.0 ml aliquot of the diluted solution to mask iron and titration of  $Zn^{+2}$  consumed 2.67 ml, 0.13 M EDTA. A second 50.0 ml aliquot was suitably buffered and titrated with 24 ml, 0.03 M  $[ZnY]^{-2}$  solution

$$Fe^{+3} + [ZnY]^{-2} \longrightarrow [FeY]^{-} + Zn^{+2}$$
 What is the condition, that enables the second titration step? Calculate percentages of ZnO (MW 81.4) and  $Fe_2O_3$  (MW 159.7) in the sample?