12/15 exc.

د. راميا

University of Jordan
Practical Analytical Chemistry 216
Midterm Exam

Date: 20/11/2013 Time: 75 minutes

Student Name: حمزه طلال ابو هنود Registration Number: 0119206

Section: ____________

Section	Instructor	Laboratory day
1 5	Ms. Samar Hazboun	Sunday afternoon Thursday afternoon
2 4 7	Dr. Ramia Al-BaKain	Monday afternoon Wednesday afternoon Thursday morning
3 6	Professor maha Tutunji	Tuesday afternoon Tuesday morning

Questions	Choices				
1	A	B	C	D	E
2	A	B	C	D	E
3	A	B	C	D	E
4	A	B	C	D	E
5	A	B	C	D	E
6	A	B	C	D	E
7	A	B	C	D	E
8	A	B	C	D	E
9	A	B	C	D	E
10	A	B	C	D	E
11	A	B	C	D	E
12	A	B	C	D	E
13	A	B	C	D	E
14	A	B	C	D	E
15	A	B	C	D	E

1) **Encircle the best statement**

(a) The true value of an unknown sample is a theoretical concept and cannot be known exactly.
(b) The absolute standard deviation of results from replicate measurements is a measure of precision, and reflects indeterminate errors
(c) Calibration of a burette is required to control determinate, systematic errors.
(d) Due to random errors present in all analytical measurements, indeterminate errors should be reported
(e) All of the above statements are correct.

2) **Encircle the correct statement:**

(a) Analysts must calibrate burettes to reduce random errors.
(b) An analyst could not dissolve all the analyte in a test sample before titration; thus he introduces a negative indeterminate error.
(c) Variance is a good measure of accuracy
(d) Relative standard deviation is a good estimate of accuracy
(e) The mean is a measure of center but it does not give the dispersion.

3) **Calculate the mass in grams Na_2CO_3 (MW=105.9 g/mole) required to neutralize 19.15 ml aliquot that is 0.1235 M in HCl?**

(a) 0.1502 g
(b) 0.0632 g
(c) 0.2222 g
(d) 0.1252 g
(e) 0.1119 g

4) **A 30.00 ml aliquot that is 0.1523 M in HCl was diluted with distilled water to a final volume of 100.0 ml. This solution was used as a titrant to determine the mass of NaOH (MW=40.00 g/mol) in an unknown sample solution. A 15.50 ml of the titrant was required to reach the end point. How many milligrams of NaOH are contained in the sodium hydroxide solution?**

(a) 25.59 mg
(b) 33.25 mg
(c) 14.36 mg
(d) 0.8965mg
(e) 28.33 mg

Two analysts performed replicate titrations (N=5) for 10.00 ml aliquots taken from two solutions, the first solution is a homogenous solution of Acetic Acid CH_3COOH (0.100M). The second solution is a heterogeneous solution consisting of 20.00 ml oil mixed with 170.00 ml (0.100M) acetic acid. All solutions were titrated against a standard solution of NaOH (0.100M) and the following volumes of the NaOH were recorded to reach the end point for each titration.

Assume that the concentration of acetic acid in all solutions was 0.100M

Encircle the correct answers in questions 5 to 8 given the following data:

	Analyst 1		Analyst 2	
	Solution 1 homogenous	Solution 2 heterogeneous	Solution 1 homogenous	Solution 2 heterogeneous
Volume of NaOH (ml)	10.05	8.15	9.90	10.50
	10.00	9.25	10.25	9.55
	9.95	7.30	10.15	10.05
	9.98	7.05	9.50	9.15
	10.15	8.95	9.00	9.25

5) The coefficient of variation (in ppt) for the results of analyst 1. related to the homogenous solution is:

(a) 7.81 %
(b) 11.95 %
(c) 5.28 %
(d) 6.38 %
(e) None of the above.

6) The variance for the results by analyst 1 related to the homogeneous sample is
(a) 7.39×10^{-4}
(b) 6.13×10^{-3}
(c) 5.23×10^{-6}
(d) 0.94
(e) None of the above

$\bar{x} = 10.026$

5.776×10^{-3} 6.76×10^{-4}

7) For analyst 1 homogeneous solution, given that the t-value at 95% confidence level is 2.8. The true value lies between one of the following:

2.116×10^{-3}

0.015376

(a) 10.03 and 10.09
(b) 9.93 and 10.12
(c) 10.03 and 11.26
(d) 9.98 and 10.23
(e) 10.03 and 11.06

8) **Encircle the correct statement:**

(a) Results of **analyst 2** for the heterogeneous solution are less accurate than results of **analyst 1** for heterogeneous solution.
(b) The relative error (%) for **analyst 1** related to the heterogeneous solution is – 0.02
(c) The relative error (%) for **analyst 1** related to the heterogeneous solution is + 0.02
(d) The median for **analyst 1** from heterogeneous samples is 8.95 x
(e) None of the above statements is correct.

9) **Encircle the correct statement:**

(a) Methyl orange is a suitable indicator for the second stage of titration of H_3PO_4 against a NaOH solution
(b) NaOH is considered a primary standard.
(c) Bromocresol green is a good indicator for the first equivalence point to be used in the titration of H_3PO_4 against NaOH.
(d) Phenolphthalein can be used as an indicator to monitor the complete reaction of NaOH with H_3PO_4.
(e) H_3PO_4 is a polyprotic strong acid.

10) **Encircle the correct statement:**

(a) Fajan's method cannot be performed in a highly acidic media, since the ferric (Fe^{3+}) ion will precipitate out. x
(b) Mohr's method was a back titration method x
(c) Mohr's method of titration can be performed in a highly basic media x
(d) Volhard's method utilized chromate ion as an indicator x
(e) The pH of the solution was kept between 6-8 in Fajan's titration

2 mol Cl = 1m   1 MgCl2 | 2 mol Cl / 1 mgcl2

11) **A 25.50ml aliquot of $AgNO_3$ solution that is 0.0315 M was added to a 10ml solution containing an unknown concentration of magnesium chloride ($MgCl_2$, MW 95.1g/mol). The solution was back titrated to reach the end point with a 12.50ml of 0.0523M solution of potassium thiocyanate (KSCN). Calculate the mass of magnesium chloride in milligrams in the unknown solution:**

9.9

1 mol Cl | 1 MgCl / 2 mol Cl
$n_{SCN} = 6.5375 \times 10^{-4}$

(a) 7.11 mg
(b) 3.25 mg
(c) 8.96 mg
(d) 25.21 mg
(e) 20.62 mg

$n_{Ag^+} = 8.0325 \times 10^{-4} = n_{Cl} + n_{SCN}$

$n_{MgCl_2} = 2.99 \times 10^{-4}$

$2AgNO_3 + MgCl_2 \rightarrow 2MgNO_3 + 2AgCl$

12) Encircle the correct statement:

(a) Phosphoric acid was added during the redox titration of Sn^{2+} to acidify the solution only
(b) SCN^- is used to confirm the complete reduction of iron (III)
(c) Zinc was amalgamated with mercury to reduce the surface area of zinc pellets for the purpose of controlling the reduction of iron (III) to iron (II)
(d) Starch is the best indicator used for titrating Fe^{3+} against dichromate.
(e) John's reductor was used to reduce iron (II) to iron (III).

13) A 15.00 ml aliquot containing an unknown concentration of a mixture of Fe(III) and Fe(II) was diluted with 1M H_2SO_4 and then titrated with a standard dichromate solution. 15.00 ml of 0.05 M $K_2Cr_2O_7$ was required to reach the end point after reducing Fe(III) to Fe(II). Calculate the amount (g/L) of Fe(II) and Fe(III) in the sample mixture (atomic mass of iron =55.58 g/mol) :

$$Cr_2O_7^{2-} + 6Fe^{2+} + 14H^+ \longrightarrow 2Cr^{3+} + 6Fe^{3+} + 7H2O$$

0.015 −

(a) 31.28 (g/L)
(b) 19.12 (g/L)
(c) 0.286 (g/L)
(d) 16.674 (g/L)
(e) 28.61 (g/L)

$Fe^{+2} = 1.25 \times 10^{-4}$

14) An impure sample containing potassium iodate (KIO_3) (formula weight = 214.00 g/mol) was analyzed. 0.2569 g of the sample was dissolved in 1 M HCl solution, and an excess of KI was added, the I_2 produced was titrated with a standard thiosulfate ($S_2O_3^{2-}$) solution (0.1214 M). 19.06 mls were required to reach the starch end point. Calculate the percent iodate in the sample given the following equations:

$$IO_3^- + 5I^- \longrightarrow 3I_2 + 3H_2O$$

$$I_2 + 2S_2O_3^{2-} \longrightarrow 2I^- + S_2O_4^{2-}$$

1.586×10^{-3} 3.85647
4.8014×10^{-13} 1.2×10^{-3}

Encircle the correct answer

$n = 1.2004 \times 10^{-3}$ mol

(a) 56.70 %
(b) 95.60 %
(c) 32.12 %
(d) 83.59 %
(e) 41.81 %

2.31386×10^{-3} 1.2×10^{-3}
3.85647×10^{-4}
4.8×10^{-3} 3.313884×10^{-3}
2.3569×10^{-3}
4.75534×10^{-3} 1.15694×10^{-3}
2.3574×10^{-3}

15) **During the determination of (Sn^{2+}) in an unknown sample solution, 20.00 ml of 0.150 M I_2 solution was added to a 10.00 ml aliquot of the unknown sample, the excess I_2 required a 10.00 ml of 0.150 M $Na_2S_2O_3$ solution to reach the end point. Calculate the molarity of the unknown (Sn^{2+}) in the sample:**

Encircle the correct answer

3x10⁻³ -

(a) 0.425 M
(b) 0.387 M
(c) 0.522 M
(d) 0.225 M
(e) 0.150 M

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University of Jordan
Practical Analytical Chemistry 216
Midterm Exam

Name(in Arabic):

Instructor O Dr. Fayyad O Dr. Alawi O Miss Samar

O Miss Ruba O Miss Muna

Reg. No.: ....

ANSWER SHEET

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

GOOD LUCK

1g H_2O → ml.

49.3571g H_2O →

Calibration of volumetric glasswre

1) 50-ml burette was calibrated by measuring the mass of the delivered water. The following data was obtained:

- Mass of water = 49.3571 g
- Density of water at 25ºC = 0.9960 g/ml

$\rho = \frac{m}{V}$

The actual volume of the delivered water is:

a) 50.17 ml b) 49.77 ml c) 49.55 ml d) 49.16 ml e) 49.36

2) You can distinguish clean glassware from dirty one by noticing that:

a) Water forms droplets on clean glassware while it forms a thin film on dirty glassware.
b) Water forms droplets on dirty glassware while it forms a thin film on clean surface.
c) Water forms droplets on clean and dirty glassware.
d) Cleanliness of glassware can be checked by adding certain indicator.
e) c + d

3) Which of the following statements is incorrect?

a) The object to be weighed on the balance should be at room temperature.
b) It is not acceptable to handle objects to be weighed with hands.
c) Chemicals could be weighed on small piece of paper.
d) The balance should be kept clean after weighing.
e) It is important to zero the balance before weighing

Sampling and statistical analysis

4) 8.5 ml of 0.10 M NaOH solution were needed to titrate 10.0 ml of acetic acid. The volume of NaOH needed to titrate a blank sample was 0.5 ml. The concentration of acetic acid is:

a) 0.085 M b) 0.080 M c) 0.097 M d) 0.092 M e) 0.089

5) In an experiment for determination of water hardness, two students got the following results:

	Student A	Student B
Mean value	40.42	40.23
Standard deviation	0.05	0.10

Assuming that the true value is 40.56, compared to student (A), student (B) is:

a) Less accurate, but more precise
b) More accurate, and more precise
c) More accurate, but less precise
d) Less accurate, and less precise
e) Non of the above

6) In an analytical Lab, a student got the following data:

15.00 ; 14.20 ; 14.90 ; 15.10 ; 15.20

If $Q_{critical}$ for five observation at 90% confidence is 0.64, the value that should be rejected is:

a) 15.00 b) 14.20 c) 15.20 d) 14.90 e) 15.10

Neutralization Titration

7) One of the following substances can be used as a solid primary standard for the preparation of a standard solution:

a) NaOH b) Na_2CO_3 c) NH_3 d) HCl e) H_3PO_4

8) 10.0 ml of an unknown phosphoric acid solution was titrated against 0.10 M standard solution of NaOH using phenolphthalein indicator. If 12.0 ml NaOH were required to reach the end point. The concentration of H_3PO_4 in g/L is:
Given: M.wt of H_3PO_4 = 98.0 g/mol.

a) 4.08 b) 23.52 c) 6.12 d) 11.76 e) 5.88

9) A solution was prepared by dissolving 0.424 g solid sodium carbonate (M.wt. = 106 g/mol) in 100 ml water. 10.0 ml of this solution were titrated with 16.0 ml of HCl solution using Bromocresol green indicator. The molarity of HCl is:

a) 0.025 b) 0.05 c) 0.0125 d) 0.25 e) 0.5

10) Which of the following statements is not correct?

a) The best indicator for the titration of the first proton in the phosphoric acid is Bromocresol green.
b) one can titrate NH_4OH against CH_3COOH with a sharp end point.
c) The color of Bromocresol green is yellow in acidic solution and blue in basic solution.
d) The water of crystallization of washing soda can be determined by neutralization titration.
e) In neutralization titration, the pH-working range of the indicator must match the pH at the equivalence point.

11) Which of the following statements about primary standard is correct:

a) A primary standard should be pure
b) A primary standard should be stable under all storage conditions
c) A primary standard should be thermally stable
d) A primary standard should be not hygroscopic
e) All of the above.

Precipetation with $AgNO_3$

12) **For the Argentometry experiment, which of the following is true**

a) In the Cl^- determination using the Fajan's method, dichloro-fluorescene is used as indicator.
b) Dichlorfluoroscene is an adsorption indicator
c) Titration using Fajan's method is a back titration
d) (A+B)
e) (B+C)

13) **A 0.5222 g sample containing chloride was dissolved in water, then treated with 15.00 ml of 0.1533 M $AgNO_3$ to precipitate the chloride ions. The excess $AgNO_3$ was back titrated with 12.3 ml of 0.1014 M KSCN. The percentage of chloride in the sample is: (A.wt. of Cl = 35.5 g/mol)**

a) 3.04% b) 0.02% c) 5.32% d) 0.22% e) 7.15%

14) **In the determination of Cl^- by volhard's method, nitrobenzene is added before the excess Ag^+ is titrated with SCN^-. The role of nitrobenzene is to prevent:**

a) Dissociation of AgSCN
b) Dissociation of AgCl
c) Precipitation of AgCl
d) Precipitaion of Fe^{3+}
e) Precipitation of AgSCN

Redox titration with dichromate

15) **What is Johne's reductor?**

a) HCl
b) Zinc granules
c) Amalgamated zinc
d) Diphenyl amine

$Cr_2O_7^{-2} + Fe^{+2} + H^+ \rightarrow Cr^{+3} + Fe^{+3} + H_2O$

16) **The chemical equation for the reaction between Fe^{+2} and $Cr_2O_7^{2-}$ in acidic solution is:**

$A\ Cr_2O_7^{2-} + B\ Fe^{2+} + C\ H^+ \rightarrow D\ Cr^{3+} + E\ Fe^{3+} + F\ H_2O$

C is: a) 6 b) 14 c) 7 d) 1 e) 2

17) **When titrating a solution containing Fe^{2+} and Fe^{3+} with dichromate in an acidic medium, the volume of dichromate consumed correspond to:**

a) Fe^{2+} b) Fe^{3+} c) Fe^{2+} and Fe^{3+} d) Pottasium dichromate does not react with iron whether in the oxidation state 2+ or 3+
e) All above statements are wrong.

Redox-titration (Iodometry)

18) **In standardization of I_2 solution by titration with standard solution of sodium thiosulfate, the starch solution was added:**

a) **At the end of the titration**
b) **Near the end of the titration**
c) **When the solution becomes dark orange**
d) **After the solution becomes colorless**
e) **No starch solution is required in this type of titration.**

19) **Which of the following statements is correct:**

a) Sn^{2+} can be determined by direct titration with I_2
b) Sn^{2+} can be determined by titration with thiosulfate solution
c) Due to the slow reaction between Sn^{2+} and I_2 , Sn^{2+} can be determined by adding a measured excess of I_2, leave it for enough time to react, and then back titrate the excess I_2 with standard thiosulfate solution.
d) Sn^{2+} is converted to Sn^{4+} when titrated with thiosulfate
e) Sn^{2+} is converted to Sn when treated with iodine.

20) **In determination of Sn^{2+} (A.wt. = 118.7 g/mol) by I_2 titration, 45.00 ml of 0.005 M I_2 was added to 10.0 ml of unknown Sn^{2+} Solution and left to react. The unreacted I_2 was titrated with 3.73 ml of 0.12 M Na_2SO_3 solution. The concentration of Sn^{2+} in mg/L is:**

moles of $I_2 = M_{Sn^{+2}} V_{Sn^{+2}} + \frac{1}{2} M_{S_2O_3} V_{S_2O_3}$

a) 14.24 b) 312.9 c) 1.057 d) 0.311 e) 0.512

$45\times10^{-3} * 0.005 = M_{Sn^{+2}} * 10\times10^{-3} + \frac{1}{2} * 3.73\times10^{-3} * 0.12$

$2.25\times10^{-4} = M_{Sn^{+2}} * 10^{-2} + 2.238\times10^{-4}$

$\frac{0.012\times10^{-4}}{10^{-2}}$

GOOD LUCK

$1.2\times10^{-4} * 11$

mg/L

0.0142 g/L $\times \frac{mg}{10^{-3} g}$

14.24 mg/L

Practical Analytical Chemistry
Medterm Exam
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ANSWER SHEET

1.	a	b	c	d	e	**9.**	a	b	c	d	e
2.	a	b	c	d	e	**10.**	a	b	c	d	e
3.	a	b	c	d	e	**11.**	a	b	c	d	e
4.	a	b	c	d	e	**12.**	a	b	c	d	e
5.	a	b	c	d	e	**13.**	a	b	c	d	e
6.	a	b	c	d	e	**14.**	a	b	c	d	e
7.	a	b	c	d	e	**15.**	a	b	c	d	e
8.	a	b	c	d	e	**16.**	a	b	c	d	e

Experiment 1: Volumetric Glassware and Balances

1. Cleaning solution which is used for dirty glassware is:

   a) Permanganate solution
   b) Sodium hydroxide solution
   c) Chromate solution
   d) Dichromate solution
   e) A mixture of dichromate and chromate solutions

2. In an experiment for calibration of a 50.00 mL burette, the following data was obtained for 5.00 mL of the burette at 25°C:

   Mass of weighed bottle = 12.3215 g
   Mass of weighed bottle + water = 17.3430 g
   The volume of 1 g of water at 25°C = 1.0038 mL

   The error in the burette reading is:

   a) 0.10 mL
   b) 0.01 mL
   c) 0.0321 mL
   d) 0.0110 mL
   e) 0.04 mL

Experiment 2: Sampling and Statistical Treatment of Data

3. Blank is defined in analytical chemistry as:

   a) All constituents where their parts can be distinguished by eye
   b) A species that causes an error in an analysis by increasing or decreasing the quantity being measured
   c) All constituents in the sample with the analyte
   d) Sample that is empty from any impurities
   e) All components and reagents in the sample except the analyte

4. In an experiment to determine the acetic acid concentration in oily sample of acetic acid, the following results were obtained when the sample titrated with NaOH (0.10 M):
10.00, 10.10, 9.90, 9.20, 10.20 mL acetic acid
Apply the Q-test (with 90% confidence level) to determine whether any of the results should be rejected ($Q_{critical}$ = 0.64):

a) 10.00 mL
b) 9.20 mL
c) 10.10 mL
d) 9.90 mL
e) 10.20 mL

Experiment 3: Neutralization Titration in Aqueous Medium

5. In the neutralization titration, the primary standard which used to standardized HCl solution is:

a) Na_2CO_3
b) $AgNO_3$
c) KIO_3
d) KOH
e) None of the above

6. In the determination of H_3PO_4 content using NaOH as titrant, there are two endpoints instead of three since:

a) No satisfactory indicator is known for the third endpoint
b) The third endpoint is very sharp
c) Very diluted NaOH solutions are needed since the third acid dissociation constant is very large
d) HPO_4^{2-} is a strong conjugate base that doesn't react with NaOH
e) Very small amounts of NaOH are required to reach the third endpoint

7. In a neutralization titration, 10.00 mL of Na_2CO_3 solution were used to standardize HCl solution with bromocresol as indicator, where 8.90 mL required volume of HCl to neutralize the Na_2CO_3 solution. In another titration 10.40 mL of standardized NaOH solution (0.10 M) required 9.20 mL of HCl solution. What was the concentration of the Na_2CO_3 solution:

a) 0.500 M
b) 0.050 M
c) 0.300 M
d) 0.105 M
e) 0.125 M

(M*V) NaOH = (M*V) HCl

0.1 * 10.40 * 10^-3 = M * 9.20 * 10^-3

1.04 / 9.20 ← 0.1 * 10.40 / 9.20

= 0.11304 M

2 (M*V) Na2CO3 = (M*V) HCl

2 * M * 10 * 10^-3 = 0.11304 * 8.90 * 10^-3

0.2012 M   1.006056 / 20

Experiment 4: Precipitation Titration (Argentimetry)

8. The titrant which is used in the argentimetric titration for the determination of chloride concentration is:

a) Sodium chloride
b) Iron thiocyanate
c) Silver nitrate   AgNO3
d) Potassium chromate
e) Silver chloride

9. In the determination of chloride concentration experiment, the indirect method which is used a known excess of silver nitrate and the remaining then is back titrated with standard thiocyanate solution using ferric indicator is:

a) Volhard's method
b) Mohr's method
c) Fajan's method
d) All of the above
e) None of the above

10. A mixture containing only KCl (74.551 g/mol) and NaBr (102.89 g/mol) is analyzed by the Mohr's method. A 0.3172 g sample is dissolved in 50 mL of water and titrated to the Ag_2CrO_4 end point, requiring 36.85 mL of 0.1120 M $AgNO_3$. A blank titration requires 0.71 mL of titrant to reach the same end point. Calculate the %w/w KCl in the sample:

a) 63.1 %w/w
b) 82.6 %w/w
c) 34.2 %w/w
d) 55.7 %w/w
e) 20.3 %w/w

Experiment 5: Redox Titrations (Dichromate Titrations)

11. One of the following advantages is not correct when using potassium dichromate over the potassium permanganate in the redox titration for the determination of the concentration of Fe^{2+} /Fe^{3+} in the sample:

a) Potassium dichromate is obtained in a state of high purity than potassium permanganate
b) Potassium dichromate can be boiled without decomposition
c) Potassium dichromate is stronger oxidizing agent than potassium permanganate
d) Potassium dichromate solution can stand for a long time without changing its concentration
e) All of the above

12. In the reduction step of Fe^{3+} to Fe^{2+} in the dichromate redox titrations experiment, complete reduction is checked by:

a) Zn(Hg) color turns grey
b) Adding one drop of solution to 1,10-phenanthroline to form iron (II) complex
c) Adding one drop of solution to NaOH to form insoluble white $Fe(OH)_3$ product
d) Adding one drop of solution to NH_4SCN to form pink-red colored complex in the presence of Fe^{3+}
e) None of the above

13. The amount of Fe in a 0.4891 g sample was determined by titrating with $Cr_2O_7^{2-}$. After dissolving the sample in H_2SO_4, the iron was brought into the Fe^{2+} using a John's reductor. Titration to the diphenylamine sulfonic acid end point required 36.92 mL of 0.02153 M $Cr_2O_7^{2-}$. Calculate the iron content Fe^{2+} as %w/w in the sample (Molar mass of Fe = 55.85 g/mol) $Cr_2O_7^{2-} + 6Fe^{2+} + 14H^+ \longrightarrow 2Cr^{3+} + 6Fe^{3+} + 7H_2O$

a) 65.8 %w/w
b) 47.1 %w/w
c) 77.9 %w/w
d) 54.4 %w/w
e) 39.3 %w/w

no. of mole $Cr_2O_7^{2-}$ = 36.92*10^-3 * 0.02153
7.949 *10^-4
n.of = mass / Mwt
no.of mole Fe^{2+} ⇒ 6 * no.of $Cr_2O_7^{2-}$
= 0.4891 / 55.85
4.769 *10^-3 ⇒
0.2
0.2663 g
after dissolve
1.

Experiment 6: Redox Titrations (Iodine Titrations)

14. Which of the following statement is true regarding the iodine titration:

a) Iodide can be oxidized
b) Iodine can be reduced
c) The fundamental process between iodine and iodide is reversible
d) The iodine used as indicator
e) All of the above

Sn^{2+}

15. In the determination of tin in an aqueous sample, I_2 solution is added to the sample and excess I_2 is back titrated with thiosulfate using the following indicator to get sharper color change at end point:

MV I_2 = MV Sn^{2+} + MV/2 $S_2O_3^{2-}$

a) Phenolphthalein
b) Potassium iodide
c) I_3
d) Methyl red
e) Starch

16. A solution of sodium thiosulfate was standardized by dissolving 0.1210 g KIO_3 (214.00 g/mol) in water, adding a large excess of KI, and acidifying with HCl. The liberated iodine required 41.64 mL of the thiosulfate solution to decolorize the blue starch/iodine complex. Calculate the molar concentration of the $Na_2S_2O_3$:

$$KIO_3 + 5KI + 6HCl \longrightarrow 3H_2O + 3I_2 + 6KCl$$
$$2Na_2S_2O_3 + I_2 \longrightarrow Na_2S_4O_6 + 2I^-$$

a) 0.1268 M
b) 0.08147 M
c) 0.8946 M
d) 0.05631 M
e) 1.326 M

no. of mol KIO_3 = $\frac{0.1210}{214.00}$ = 5.654×10^{-4}

$\frac{MV}{2} S_2O_3 = MV I_2$

no. of mol I_2 = 1.696×10^{-3}

$M \cdot 41.64 = 3.392 \times 10^{-3}$

8.1472

Good Luck

$n = \frac{m}{Mwt}$

$\frac{MV (S_2O_3^{-2})}{6} = MV (KIO_3)$

$\frac{MV\ S_2O_3^{-2}}{2} = MV\ I_2$

$\left[\frac{MV\ Sn^{+2}}{1} = MV (Sn^{+2}) + \frac{MV\ S_2O_3^{-2}}{2} \right]$

$KIO_3 \rightarrow I_2$
$1 \rightarrow 3$
$5.654 \times 10^{-4} \rightarrow x$

$x = n_{I_2} = 1.696 \times 10^{-3}$ mole