	Tanta University, Faculty of Pharmacy **Department of Pharmaceutical Analytical Chemistry**			
	Examination For **1st Level Pharm D Students (Clinical Pharmacy)**			
	Course Title: **Pharmaceutical Analytical Chemistry -II**			Course Code: **PA 202**
	Date: **19 /06 /2021**	Term: **2nd**	Marks: **50** Total pages: **7**	Time Allowed: **2 hrs.**

- Check that your exam booklet consists of (7) **pages**.
- Choose **ONE** best answer for each question and mark it in the separate answer sheet (pink bubble sheet). ***Answers anywhere else will not be marked.***
- **Instructions for using bubble sheet:**
  1. At the top section of the bubble sheet, write your name and your academic number.
  2. **Each bubble on the sheet stands for one answer.** Fill in the bubble completely, but do not make stray marks outside of the bubble.

The right way to fill in the bubble sheet

Trust yourself

You know more than you think you do

Best wishes in the Exam

1. **Reducing agent.....**

a) Is reduced as it gains electrons.
b) Is oxidized as it loses electrons .
c) Is reduced as it loses electrons.
d) Causes another reactant to be oxidized.

2. **Consider this reaction:** $3Au_{(s)} + 8H^+ + 2NO_3^- \rightarrow 3Au^{2+}_{(aq)} + 2NO_{(g)} + 4H_2O_{(L)}$

a) $Au_{(s)}$ is reduced while N is oxidized.
b) $Au_{(s)}$ is reduced while H^+ is oxidized.
c) $Au_{(s)}$ is oxidized while N is reduced.
d) $Au_{(s)}$ is oxidized while H^+ is reduced.

3. **Which of following reactions is NOT an example of redox reaction**

a) $CuO + H_2O \rightarrow Cu + H_2O$
b) $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$
c) $2K + F_2 \rightarrow 2KF$
d) $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

4. **Using the standard electrode potential of redox couples given below find out which of the following is the strongest oxidizing agent. E (V) values: $Fe^{3+}/Fe^{2+} = +0.77$; $I_2(s)/I^- = +0.54$; $Cu^{2+}/Cu = +0.34$; $Ag^+/Ag = +0.80$V**

a) Ag^+ b) I_2 c) Cu^{2+} d) Fe^{3+}

5. **Which of the following contains molybdenum (Mo) with its highest oxidation number?**

a) Mo_6Cl_{12} b) $MoCl_5$ c) Mo_2S_3 d) MoO_4^{2-}

6. **If Fe^{3+} (aq) and Cl^- (aq) are mixed , $FeCl_3$ (aq) results . However, if Fe^{3+} (aq) and I^- (aq) are mixed, FeI_3 (aq) does not result. Which of the following best describes WHY?**

a) Fe^{3+} is too strong reducing agent.
b) I^- is oxidized in the solution.
c) Fe^{3+} forms an acidic solution.
d) FeI_3 is soluble.

7. **If solid nickel metal were added to separate aqueous solutions each containing 1M concentrations of Ag^+, Cd^{2+}, Sn^{2+}, and Ni^{2+} ions, which metals would plate out, based on the given standard reaction potentials?**

a) Ag b) Zn c) Ni d) Cd

Standard Redox Potentials	
Ag^+/Ag	0.799 V
Zn^{2+}/Zn	−0.76 V
Ni^{2+}/Ni	−0.236 V
Cd^{2+}/Cd	−0.400 V

8. **The equivalent weight of the reducing agent in the following equation**

$K_2Cr_2O_7 + FeSO_4 = Cr^{3+} + Fe^{3+}$ **is equal to .....**

a) $\frac{1}{6}$ Molecular weight.
b) Molecular weight
c) $\frac{1}{2}$ Molecular weight
d) $\frac{2}{6}$ Molecular weight

9. **What is coefficient of bromide ion when the following equation is balanced ?**

$MnO_4^- + \ldots\ldots Br^- \rightarrow Mn^{2+} + Br_2$ (acidic solution)

a) 1 b) 2 c) 5 d) 10

10. **pH affects the potential of the following redox couples EXCEPT:**

a) MnO_4^-/Mn^{2+} b) AsO_4^{3-}/AsO_3^{3-} c) Fe^{3+}/Fe^{2+} d) $Cr_2O_7^{2-}/2Cr^{3+}$

11. **For oxidation of I^- by $[Fe(CN)_6^{3-}]$..... should be added**
($Fe(CN)_6^{3-}$/ $Fe(CN)_6^{4-}$) E°=+0.57 volt and I_2/I^-(E°= 0.54 V)

a) NaOH b) HCl c) F^- d) Zn^{2+}

12. **Redox indicator should .....**

a) Have pale color.
b) Undergo irreversible reaction.
c) Have transition E in between E^0 sample and E^0 titrant.
d) Have low solubility in water.

13. **Which of the following is NOT a redox indicator?**

a) Diphenylamine b) Starch c) Ferroin d) Diphenylamine p- sulfonic acid

14. **The color range interval of the following indicator.**

$In + 2e \longrightarrow In^{2-}$ **(E° = 1.5 V)**

a) 0.5 -2.5 V b) 1.25 – 1.75 V c) 0.65 - 0.75 V d) 1.47 – 1.53 V

15. **IF equal volumes of 1M $K_2Cr_2O_7$ and 1M $KMnO_4$ solutions are used to oxidize Fe^{2+} in acidic medium, the amount of Fe^{2+} oxidized will be.....**

a) More by $K_2Cr_2O_7$.
b) More by $KMnO_4$
c) Equal in both cases.
d) cannot be determined.

16. **Which of the following statements concerning $KMnO_4$ is NOT TRUE?**

a) Strong oxidizing agent.
b) Serves as self-indicator.
c) Primary standard.
d) Oxidizes Oxalic acid.

17. **A redox titration is carried out by adding Purple $KMnO_4$ solution from a burette to a solution of H_2O_2 in a flask, under acidic conditions. Which of the following would correctly describe the observed color and the product formed in the flask AT THE EQUIVALENCE POINT?**

	Observed Color	Product Formed
a)	becomes colorless	H_2
b)	remains purple	H_2
c)	becomes colorless	O_2
d)	remains purple	O_2

18. **All of the following is correct during titration of $NaNO_2$ with $KMnO_4$ EXCEPT.....**

a) Nitrite is oxidized according to the equation: $NO_2^- + H_2O = NO_3^- + 2H^+ + 2e^-$
b) NO_2^- is unstable in acids, so titration is reversed.
c) The end point is reached when purple color is observed.
d) Dil H_2SO_4 is used to adjust pH of the redox reaction.

19. **Zimmermann-Reinhardt's Reagent (ZRR):is composed of .....**

a) HCl, H_3PO_4 , MnO_2 .
b) H_2SO_4, H_3PO_4, MnO_2.
c) HCl, H_3PO_4 , $MnSO_4$.
d) H_2SO_4, H_3PO_4, $MnSO_4$.

20. **In titration of Fe^{2+} with $K_2Cr_2O_7$ using diphenylamine as indicator, H_3PO_4 is added to.....**

a) Increase oxidation potential of Fe^{3+}/Fe^{2+}.
b) Decrease oxidation potential of Fe^{3+}/Fe^{2+} .
c) Increase oxidation potential of $Cr_2O_7^{2-}/ Cr^{3+}$.
d) Decrease oxidation potential of $Cr_2O_7^{2-}/ Cr^{3+}$

21. Which of the following acts as external indicator?

a) $KMnO_4$ **b)** Potassium hexacynoferrate **c)** Diphenyl amine **d)** Naphthol Blue black

Consider the Titration of 100 mL of 0.1N $FeSO_4$ against 0.1 N $Ce(SO_4)_2$.
The $E^o Fe^{3+}/Fe^{2+}$ = 0.77 V and $E^o Ce^{4+}/Ce^{3+}$ = 1.70 V . Answer questions 22-23

22. The potential at the equivalence point is V

a) +0.770 V **b)** +1.70 V **c)** +1.235 V **d)** +1.523 V

23. The potential at 50% titration is V

a) +0.770 V **b)** +1.70 V **c)** +1.235 V **d)** +1.523 V

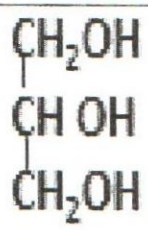
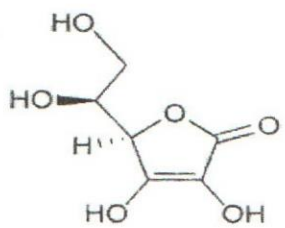
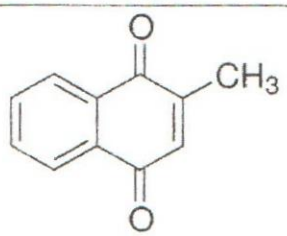
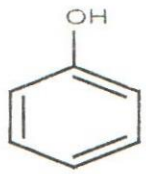
24. All of the following is CORRECT about Iodimetry EXCEPT.....

a) I_2 is used as a titrant.
b) Oxidizing analyte is being determined.
c) I_2 reduced to I^-.
d) Reducing analyte is being determined

25. In the determination of GLYCEROL by $K_2Cr_2O_7$, measured excess of $K_2Cr_2O_7$ is added in presence of H_2SO_4, the excess unreacted $K_2Cr_2O_7$ is determined.....

a) Iodimetrically **b)** Iodometrically
c) Using Oxalic acid. **d)** Using $K_3[Fe(CN)_6]$

The following compounds (a→d) can be determined by redox titration.
Answer questions (26-28) by selecting ONLY ONE structure for each question.

a)	b)	c)	d)
			

26. ..... Can be determined by ceric sulfate solution and o -phenanthroline indicator after reduction with Zn/HCl.

27. .....Can be determined iodimetrically using Starch as indictor.

28. ..... Can be determined by BrO_3^-/Br^- reagent in acid medium, and the remaining Br_2 is back titrated iodometrically.

29. **Karl Fischer reagent is composed of …….. and used for determination of ……according to the following reaction:**

$$SO_2 + 2H_2O + I_2 = SO_4^{2-} + 4H^+ + 2I^-$$

a) I^- , SO_2 in anhydrous pyridine & anhydrous methanol / Water content .
b) I^- , SO_2 in anhydrous pyridine & anhydrous methanol / Hydroxyl value.
c) I_2, SO_2 in anhydrous pyridine & anhydrous methanol / Water content
d) I_2 , SO_2 in anhydrous pyridine & anhydrous methanol / Hydroxyl value .

30. **All the following should be considered to prevent errors in Iodine involving titrations EXCEPT……**

a) Use freshly prepared KI solution.
b) Iodine flask should be used.
c) Use freshly prepared starch.
d) Perform titrations at high temperature.

31. **Consider the following redox reaction:**

$$2I_2 + S_2O_3^{2-} + 3H2O \longrightarrow 4I^- + 2H_2SO_3 + 2H^+$$

A 10.0 mL sample of an I_2 solution is titrated with 13.2 mL of 0.0374 M $Na_2S_2O_3$. What is the $[I_2]$ of the sample?

a) 0. 0987 M
b) 0. 0494 M
c) 0. 0426 M
d) 0. 0247 M

32. **10 mL of 0. 2 M Fe^{2+} ion was titrated against 0.01 M of $KMnO_4$ solution in acidic medium . ……mL of 0.01 M $KMnO_4$ was required to reach to Equivalence point.**

a) 10
b) 20
c) 30
d) 40

33. **In the titration of an oxidant analyte with a reductant titrant which has an equivalence point potential of 0.32 V, redox indicator with transition range 0.37- 0.43 V was used. The end point obtained was……**

a) Accurate E.P.
b) Early E.P.
c) Late E.P
d) Cannot be determined

34. **Electromagnetic radiation is not usually involved in MS.**

a) True
b) False

35. **Molecular fluorescence is considered as ……order technique.**

a) First
b) Zero
c) Second
d) None of these.

36. **…… is considered as classical analytical method(s).**

a) MS
b) HPLC
c) Voltammetry
d) None of these.

37. **Titrimetry is more sensitive than UV spectrophotometry.**

a) True
b) False

38. **Measurement of UV absorbance of paracetamol at 244 nm is considered as single channel method of analysis.**

a) True
b) False

39. **Classical methods are not suitable for forensic analysis.**

a) True
b) False

40. **Classical analytical methods measure some physical properties of the analyte.**

a) True
b) False

41. **.....method(s) can give more accurate results when sample matrix causes severe interference during analysis.**
a) Calibration curve b) Standard addition c) Both of these d) None of these.

42. **Mohr method used for determination of chloride by precipitation titration represents an absolute analytical method.**
a) True b) False

43. **Gravimetry is considered as ..... order technique.**
a) First b) Second c) zero d) None of these.

44. **.....has E= zero at all temperatures.**
a) HE b) SCE c) Ag/AgCl electrode d) None of these

45. **The electrode of $Cl_2(g)/2Cl^-$ redox couple is of.....**
a) First kind b) Second kind c) Inert kind d) Reference kind

46. **The electrode potential of $Zn^0/Zn\ SO_4$ is dependent on.....**
a) Sulphate ion concentration as it is electrode of first kind.
b) Zinc ion concentration as it is electrode of second kind.
c) Zinc ion concentration as it is electrode of first kind.
d) Sulphate ion concentration as it is electrode of second kind.

47. **pH responsive electrodes of second kind such as.....**
a) GE b) Hydrogen electrode c) Quinhydrone electrode d) None of these

48. **Quartz has a good electrode function.**
a) True b) False

49. **.....can be used as Na-ISE.**
a) Corning 015 (soda-lime type) glass. b) NAS (11-18) glass.
c) Lithia Silica glass. d) None of these

50. **Internal filling solution in Ca-ISE contains.....**
a) 0.1M $CaBr_2$ b) 0.1M $CaCl_2$ c) 0.1M HCl d) 0.1M $CaSO_4$

51. **Incorporation of ..... into PVC organic membrane for manufacturing of K-ISE.**
a) Erythromycin b) KCl
c) Valinomycin d) Tridodecylhexadecylammonium nitrate

52. **.....has a membrane contains didecyl phosphate dissolved in dioctylphenyl phosphate.**
a) Ca-ISE b) K-ISE c) NO_3- ISE d) F-ISE

53. **..... generates a comparatively small junction potential (E_j) at the two salt-bridge solution interfaces.**
a) Ag^0/AgCl (s), KCl (1M) b) SCE c) SHE d) None of these

54. **All the following electrodes are reference electrodes EXCEPT.....**
a) HE b) SCE c) Ag^0/AgCl (s), KCl (1M) d) None of these

55. **Hg^0/Hg_2Cl_2 (satd), KCl (0.1M) is an example of.....**
a) Primary reference electrode. b) Secondary reference electrode.
c) Electrode of first kind. d) None of these.

56. Mg(s) /Mg^{+2}(1M) // Ag^{+} (1M)/ Ag(s) is an ECC, When it operates, observations include.....

a) Increase in the mass of magnesium electrode & decrease in conc. of Ag^{+}
b) Increase in the mass of magnesium electrode & increase in conc. of Ag^{+}
c) Decrease in the mass of magnesium electrode & decrease in conc. of Ag^{+}
d) Decrease in the mass of magnesium electrode & increase in conc. of Ag^{+}

57. The electrode potential of Ag^{0}/AgCl (s), KCl (aq) is dependent on.....

a) Chloride ion concentration as it is electrode of first kind.
b) Silver ion concentration as it is electrode of second kind.
c) Silver ion concentration as it is electrode of first kind.
d) Chloride ion concentration as it is electrode of second kind.

58. Hydrogen electrode can be used to measure pH of H_2CO_3

a) True b) False

59. Regarding quinhydrone electrode, all the following are true EXCEPT.....

a) It can be used for determination of pH of volatile acids.
b) It can be used in presence of oxidizing or reducing agents.
c) It is not affected by catalytic poisoning
d) It comes to equilibrium rapidly.

60. .....can be used for measuring pH in presence of oxidizing agents.

a) HE b) GE c) Antimony electrode d) Quinhydrone electrode

61. pH ion exchange electrode type includes.....

a) pH-GE b) NAS (11-18)
c) Quinhydrone electrode d) pH-GE & Quinhydrone electrode

62. Antimony electrode used for measuring pH is.....

a) Inert electrode. b) Electrode of first kind.
c) Electrode of second kind. d) None of these.

63. .....is a property of each GE.

a) E_j b) E_b c) E_{asym} d) None of these

64. Hygroscopic glass has a good electrode function.

a) True b) False

65. $E_b = L` - 0.059\ pH$, L' constant represents.....

a) Asymmetry potential. b) E of internal reference electrode
c) pH of the internal solution. d) None of these

66. Alkaline error can be overcome by.....

a) Corning 015 (soda-lime type) glass. b) NAS (11-18) glass.
c) Lithia Silica glass. d) Corning 015 or Lithia Silica glass.

Good luck!