The Exam consists of three questions in (8) pages:

Q1: You MUST select The Letter Of ONE Best Answer In The Following Answer She

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>36</td>
<td></td>
<td></td>
<td></td>
<td>71</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>37</td>
<td></td>
<td></td>
<td></td>
<td>72</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>38</td>
<td></td>
<td></td>
<td></td>
<td>73</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>39</td>
<td></td>
<td></td>
<td></td>
<td>74</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td>75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>41</td>
<td></td>
<td></td>
<td></td>
<td>76</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td>42</td>
<td></td>
<td></td>
<td></td>
<td>77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td>43</td>
<td></td>
<td></td>
<td></td>
<td>78</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td>44</td>
<td></td>
<td></td>
<td></td>
<td>79</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td>45</td>
<td></td>
<td></td>
<td></td>
<td>80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(160 points)
1) Potassium ion contains equal number of protons and electrons
a- true  
b- false

determine the chemical properties of an element
a- true  
b- false

3) In hydrogen gas, the two hydrogen atoms joined together by
a- ionic bond  
b- covalent bond  
c- none of them

different number of
a- protons  
b- neutrons  
c- electrons  
d- none of them

5) The bond produced by sharing of electrons between two atoms is called
a- ionic bond  
b- covalent bond  
c- coordinate bond  
d- none of them

6) The most important factor affect the partial ionic character is
a- the electronegativity difference  
b- common ion effect  
c- degree of ionization  
d- none of them

7) In complex formation, the ligand acts as
a- Lewis acid  
b- Lewis base  
c- electron donor  
d- none of them

8) Phosphoric acid is
a- diprotic acid  
b- monoprotic acid  
c- triprotic acid  
d- none of them

9) By addition of ammonium chloride to a solution of ammonium hydroxide; the
ionization of ammonium hydroxide will
a- increase  
b- decrease  
c- stop  
d- unaffected

10) An acid is said to be more acidic than other acid when
a- it has larger ionisation constant  
b- it has lower ionisation constant  
c- it has more negative ionisation constant  
d- it has lower negative ionisation constant

11) NH₄⁺ is the conjugate base of ammonia
a- true  
b- false

12) To write correct ionic equation, strong electrolyte should be written in
a- ionic form  
b- unionized form  
c- either one  
d- neither one

13) The rate of chemical reaction is inversely proportional to product of the molar
concentration of reacting substances
a- true  
b- false

14) K in the final chemical equilibrium mixture is affected by
a- the catalyst  
b- the conc. of reacting substances  
c- the temperature  
d- all of them

15) Solubility of Ag(CN) increases
a- by addition of HNO₃  
b- by addition of excess cyanide  
c- a or b  
d- none of them

16) Solubility product constant of Fe(OH)₃ equals
a-[Fe⁺³][OH⁻]  
b-[Fe⁺³]+[OH⁻]  
c-[Fe⁺³][OH⁻]  
d- none of them

17) Lime water test is used to differentiate between CO₃²⁻ and SO₃²⁻ after addition of
HCl
a- True  
b- false
18) Strong oxidizing agents such as KMnO₄ & K₂Cr₂O₇ oxidize S₂O₇²⁻ into
a- Sulfate  b-tetrahydroxate  c-sulfite  d-none of them

19) SO₂ and H₂S gas have the same effect
a-on lime water  b-on K₂Cr₂O₇ solution
b-on KMnO₄ solution  d-(b),(c)

20) The reason for the answer in the former point is that
a-H₂S has reducing action  b-both gases have reducing action
b-sulfite is oxidizing agent  d-H₂S is oxidizing agent

21) The action of dil H₂SO₄ is the same as dil HCl on CaCO₃
a-true  b-false

22) Borax test is specific test for
a-NO₃⁻  b-SO₄²⁻
c-S₂O₃²⁻  d-None of them

23) SO₂ gas is produced with precipitation of elemental sulfur upon addition of HCl to
a-Na₂SO₄  b-Na₂S₂O₃
c-Na₂S  d-Na₂SO₃

24) Thiosulfate solution form purple complex which disappears after short time with
a-FeCl₃ solution  b-BaCl₂ solution
c-AgNO₃ solution  d-none of them

25) Thiosulfate decolorize iodine solution according to the following equation
a-I₂+2S₂O₃²⁻ = 2I⁻ + S₄O₆²⁻  b-I₂+S₂O₃²⁻+H₂O = 2SO₄²⁻+2HI
c-I⁻+S₄O₆²⁻+H₂O = 2H⁺+2SO₄²⁻  d-None of them

26) By boiling thiosulfate solution with CN⁻ in alkaline medium, the product gives
a-red color with Fe³⁺  b-blue color with Fe²⁺
c-purple color with Fe³⁺  d-none of them

27) H₂SO₄ acid should be poured into water for dilution this is due to its
a-oxidizing properties  b-dehydrating properties
c-acidity  d-none of them

28) All these factors increase solubility except
a-heating  b-diverse ions
c-common ions  d-complex ions

29) S₂O₃²⁻ can be separated from SO₄²⁻ by addition of
a-BaCl₂  b-AgNO₃
c-(CH₃COO)₂pb  d-none of them

30) S²⁻ can be separated from its mixture with S₂O₃²⁻ by addition of
a-AgNO₃  b-(CH₃COO)₂pb
b-CdCO₃  d-none of them

31) The following acid has corrosive action on glass producing oily appearance
a-HCl  b-HF
c-HBr  d-H₂SO₄

32) HCl gas gives white fumes with glass rod moistened with
a-NaOH  b-NH₄OH
c-KOH  d-none of them

33) Cl₂ gas is produced upon heating Cl salt
a-with concentrated sulfuric and MnO₂  b-with concentrated sulfuric
c-a or b  d-none of them

34) HCl has more reducing power than HBr
a-true  b-false
35) Potassium iodide starch paper turns blue by exposure to Cl₂ gas because it is a reducing agent. 

36) All the following statements are false concerned to chloride water test except:
   a. It is a specific test for chloride.
   b. Oxidizing agent.
   c. It gives no result with iodide.
   d. None of them.

37) By carrying out chlorine water test for chloride:
   a. Chloroform layer turns violet then brown.
   b. Chloroform layer turns violet.
   c. Chloroform layer turns brown then violet.
   d. No color in chloroform layer.

38) To analyze a mixture of chlorine and chloride, chlorine should be removed by:
   a. Metallic iron.
   b. Cu wire.
   c. Metallic mercury.
   d. None of them.

39) Ag⁺ is soluble in:
   a. Dilute NH₄OH.
   b. Concentrated NH₄OH.
   c. HCl.
   d. None of them.

40) Acidified nitrite solution can oxidize:
   a. Br⁻ into bromine.
   b. I⁻ into iodine.
   c. Both of them.
   d. None of them.

41) Both NO₂ and NO₃⁻ give brown fumes of NO₂ with dil HCl:
   a. True.
   b. False.
   c. CN⁻.
   d. All of them.

42) NH₃ will be evolved by boiling zinc dust and NaOH with a solution of:
   a. NO₂⁻.
   b. NO₃⁻.
   c. CN⁻.
   d. All of them.

43) NO₃⁻ acts as:
   a. Oxidizing agent.
   b. Reducing agent.
   c. Both of them.
   d. None of them.

44) Nitrite can be removed from its mixture with nitrate by treating with:
   a. Ag₂SO₄.
   b. Urea.
   c. NH₄Cl.
   d. Both a and c.

45) Silver group precipitated by addition of:
   a. Dil HCl.
   b. Conc. HCl.
   c. HNO₃.
   d. H₂SO₄.

46) Both HgCl₂ & PbCl₂ are soluble in hot water:
   a. True.
   b. False.

47) Precipitation of copper-arsenic group is carried out by:
   a. H₂S in acidic medium.
   b. H₂S in alkaline medium.
   c. Triacetamide in alkaline medium.
   d. None of them.

48) The solubility product of CuS is higher than that of COS:
   a. True.
   b. False.

49) CdS is more electronegative than Sn₂S₃:
   a. True.
   b. False.

50) As₂S₃ is soluble in:
   a. Na₂S.
   b. KOH.
   c. (NH₄)₂S.
   d. All of them.

51) HgS is soluble in:
   a. HNO₃.
   b. HCl.
   c. Aqua regia.
   d. None of them.
52) pb\(^{2+}\) is separated from other cations of copper gp as
   a- chloride
   b- nitrate
   c- sulfate
   d- none of them

53) bismuth, copper and cadmium form soluble complexes with ammonia
   a- true
   b- false
   c- Cu\(^{2+}\)
   d- none of them

54) SnCl\(_2\) can be used to detect the presence of
   a- Fe\(^{3+}\)
   b- Hg\(^{2+}\)
   c- Cu\(^{2+}\)
   d- none of them

55) SnCl\(_2\) in the former reaction act as
   a- oxidizing agent
   b- reducing agent
   c- complexing agent
   d- none of them

56) KCN forms more stable complex with Cd\(^{2+}\) than with Cu\(^{2+}\)
   a- true
   b- false

57) One of these cations gives blue solution with ammonia
   a- Cu\(^{2+}\)
   b- Bi\(^{3+}\)
   c- Mg\(^{2+}\)
   d- none of them

58) Acidification is necessary for reprecipitation of arsenic group using
   a- HCl
   b- Acetic acid
   c- HNO\(_3\)
   d- a or b

59) To separate As\(_2\)S\(_3\) from Sb\(_2\)S\(_3\) we add
   a- conc. HCl
   b- Acetic acid
   c- aqua regia
   d- none of them

60) The solubility of As\(_2\)S\(_3\) in HNO\(_3\) is a type of
   a- oxidation reduction reaction
   b- complex formation reaction
   c- ionic transfer reaction
   d- none of them

61) Magnesium mixture consists of
   a- MgCl\(_2\) + NH\(_4\)Cl + NH\(_4\)OH
   b- MnCl\(_2\) + NH\(_4\)Cl + NH\(_4\)OH
   c- MgCl\(_2\) + NH\(_4\)HCO\(_3\) + NH\(_4\)OH
   d- none of these

62) To test for Sb\(^{3+}\) in presence of Sn\(^{4+}\) using H\(_2\)S we should previously add
   a- iron metal
   b- oxalic acid
   c- HCl
   d- none of them

63) By addition of iron metal to Sb\(^{3+}\)
   a- it is reduced to metallic Sb
   b- it is oxidized to Sb\(^{5+}\)
   c- it is oxidized to Sn\(^{4+}\)
   d- none of these

64) Group III precipitated as hydroxides using
   a- NH\(_4\)OH / NH\(_4\)Cl
   b- NaOH
   c- NH\(_4\)OH
   d- none of them

65) Solubility product of Cr(OH)\(_3\) is higher than Mg(OH)\(_2\)
   a- true
   b- false

66) For complete precipitation of Cr(OH)\(_3\)
   a- excess ammonia is avoided
   b- HNO\(_3\) should be added
   c- boiling is required
   d- a & C

67) Both Cr(OH)\(_3\) and Fe(OH)\(_3\) are amphoteric
   a- true
   b- false

68) In group III before testing for CrO\(_4\)\(^{2-}\) by lead acetate
   a- solution is acidified by HCl
   b- solution is alkalized by excess NaOH
   c- solution is acidified by acetic
69) Precipitation of zinc group is made in
a-acidic medium
b-alkaline medium
c-pH is unimportant
d-none of them

70) both MnS and ZnS are soluble in HCl
a-true
b-false

71) Mn(OH)₂ can be separated from Zn(OH)₂ by NaOH/H₂O₂ because
a-Mn(OH)₂ is oxidized to MnO₂
b-Mn(OH)₂ is soluble in NaOH
c-Zn(OH)₂ is amphoteric
d-none of them

72) Alkaline earth group is precipitated as carbonate by
a-Na₂CO₃
b-(NH₄)₂CO₃
(c-(NH₄)₂CO₃/HCl)
d-None of them

73) CaCO₃ and SrCO₃ are soluble in acetic acid
a-true
b-false

74) Red lead oxide is used to test for
a-Mg²⁺
b-Mn³⁺
c-Co³⁺
d-none of them

75) The test in (74) the medium should be
a-acidic using HCl
b-acidic using HNO₃
c-alkaline using NaOH
d-none of them

76) The acidic character of As₂S₃ is higher than Sb₂S₃ and SnS.
a-true
b-false

77) Sodium thiosulfate give orange precipitate with
a-As
b-arsenic
c-antimony
d-none of them

78) All those hydroxides are soluble in NaOH/H₂O₂ except
a-Fe(OH)₃
b-Cr(OH)₃
c-Al(OH)₃
d-Zn(OH)₂

79) K₃Fe(CN)₆ gives a blue precipitate or color (Prussian blue) with
a-Cu²⁺
b-Zn²⁺
c-Fe³⁺
d-none of them

80) SCN⁻ gives blue color with
a-Co²⁺
b-Ni²⁺
c-Fe²⁺
d-none of them

Q2: Complete the following statements, write the answer in the table: (30 points)

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>
1. ......................is a substance used to detect the presence of Ag⁺.
2. ......................is a substance used to test for Pb²⁺.
3. ......................is a substance used to detect presence of Bismuth ion
4. ......................is a substance used to detect the presence of cobalt
5. ......................is a reagent gives a rose chelate with Nickel.
6. ......................is a substance used as masking agent for calcium.
7. ......................is a reagent gives orange precipitate with NH₄⁺
8. A filter paper impregnated in .............. converted into black with ammonia
9. ......................is a substance used to detect the presence of K⁺
10. ......................is a substance used to detect the presence of Na⁺
11. The cation should be detected at first in the original solution is.............
12. Barium separated from Ca²⁺ & Sr²⁺ as .....................
13. Flame test gives brick red color with.........................
14. Aluminon reagent gives red precipitate with..................
15. ......................gives yellow precipitate with arsenic.
Q.3: Illustrate with chemical equations four only of the following: (20 points)

1) Disproportionation reaction

2) Perchomac acid test

3) Brown ring test for nitrate

4) Hepar’s test

5) Chromyl chloride test

6) Lime water test

Good luck