NEET UG (2024)
Chemistry
Quiz-6

SECTION - A

51. Two particles A and B are in motion. If the wavelength associated with the particle A is 5.0×10^{-8} m, the wavelength of particle B having momentum half of A is:

(1) 2.5×10^{-8} m (2) 1.254×10^{-8} m
(3) 1.0×10^{-7} m (4) 1.0×10^{-8} m

52. A 100 watt bulb emits monochromatic light of wavelength 400 nm. Calculate the number of photons emitted per second by the bulb.

(1) $20.12 \times 10^{20}\ s^{-1}$ (2) $2.012 \times 10^{20}\ s^{-1}$
(3) $4.969 \times 10^{-19}\ s^{-1}$ (4) $49.69 \times 10^{-19}\ s^{-1}$

53. Which one of the following transition have minimum wavelength?

(1) $n_4 \rightarrow n_1$ (2) $n_2 \rightarrow n_1$
(3) $n_4 \rightarrow n_2$ (4) $n_3 \rightarrow n_1$

54. The plot of square root of frequency of X-rays emitted against atomic number led to the suggestion of which law (rule)?

(1) Mendeleev's periodic law
(2) Modern periodic law
(3) Hund's rule
(4) Newlands' law of octaves

55. Number of degenerate orbitals present in 2p subshell of hydrogen-like species is:

(1) 7 (2) 5
(3) 3 (4) 1

56. Heisenberg's uncertainty principle can be expressed as:

(1) $\Delta x \times \Delta v \geq h/4\pi$
(2) $\Delta x \times \Delta p \geq h/4\pi$
(3) $\Delta x \times \Delta p \geq h/2\pi$
(4) $\Delta x \times \Delta v \geq h/2\pi$

57. Choose the correct option among the following:

Value of *l*	**Shape of orbital**
a. 1	(i) Complex
b. 0	(ii) Dumb-bell
c. 2	(iii) Spherical
d. 3	(iv) Double dumb-bell

(1) a-(ii), b-(iii), c-(i), d-(iv)
(2) a-(iii), b-(ii), c-(i), d-(iv)
(3) a-(ii), b-(i), c-(iii), d-(iv)
(4) a-(ii), b-(iii), c-(iv), d-(i)

58. If the de-Broglie's wavelength of a particle of mass 1g is 6.626×10^{-29} m, then its speed is:
($h = 6.626 \times 10^{-34}$ Js)
(1) 100 m s^{-1} (2) 0.20 m s^{-1}
(3) 0.01 m s^{-1} (4) 3.00 m s^{-1}

59. The set of quantum numbers which is not possible is:
(1) n = 3, l = 2, m = –1, s = +1/2
(2) n = 1, l = 0, m = 0, s = – 1/2
(3) n = 2, l = 1, m = 0, s = +1/2
(4) n = 1, l = 1, m = 0, s = – 1/2

60. The wavelength of radiation emitted when the electron in an hydrogen atom undergoes transition from 8^{th} energy level to 2^{nd} energy level
(R = Rydberg constant)
(1) 15R/64 (2) 15/64R
(3) 64R/15 (4) 64/15R

61. The presence of three unpaired electrons in the nitrogen atom can be explained by:
(1) Hund's rule of maximum multiplicity
(2) Pauli's exclusion principle
(3) Heisenberg's uncertainty principle
(4) Aufbau's principle

62. Consider the given table.

Metals	**Threshold frequency ($\times 10^{14}$ s^{-1})**
A	5.2
B	3.8
C	4.6
D	5.8

Photoelectrons ejected from which metal surface will have highest kinetic energy on irradiating with light of frequency 8.6×10^{15} s^{-1}?
(1) C (2) B
(3) A (4) D

63. Light of energy 4.7×10^{-19} J is irradiated on a metal surface having work function equal to 2.02 eV. The kinetic energy of the emitted photoelectron is (charge of electron = 1.6×10^{-19} C)
(1) 0.92 eV (2) 2.68 eV
(3) 6.09 eV (4) 4.96 eV

64. The correct order of atomic radii among the group 13 elements is:
(1) B < Al < In < Ga < TI
(2) B < Al < Ga < In < TI
(3) B < Ga < Al < TI < In
(4) B < Ga < Al < In < TI

65. The order of screening effect of electrons of s, p, d and f orbitals of a given shell of an atom on its outer shell electrons is:
(1) s > p > d > f (2) f > d > p > s
(3) p > f > d > s (4) f > p > s > d

66. An element having electronic configuration $1s^2$ $2s^2$ $2p^6$ $3s^2$ $3p^1$ is:
(1) An inert gas
(2) A transition element
(3) An inner transition element
(4) A p-block element

67. For the element (X), student (A) measured its radius as 102 nm, student (B) as 109 nm and (C) as 100 nm using same apparatus. Their teacher explained that measurements were correct by saying that recorded values by (A), (B) and (C) are:
(1) Crystal, van der Waal and covalent radii.
(2) Covalent, crystal and van der Waal radii.
(3) Van der Waal, ionic and covalent radii.
(4) None is correct.

68. The element having electronic configuration [Kr]$4d^{10}$ $4f^{14}$, $5s^2$ $5p^6$, $6s^2$ belongs to:
(1) *s*-block (2) *p*-block
(3) *d*-block (4) *f*-block

69. Which of the following is iso-electronic with carbon atom?
(1) Na^+ (2) Al^{3+}
(3) O^{2-} (4) N^+

70. Order of atomic radii of Ti, Zr and Hf is:
(1) Ti > Zr > Hf (2) Ti < Zr < Hf
(3) Ti < Zr = Hf (4) Ti = Zr = Hf

71. The correct order of radii is:
(1) N < Be < B
(2) $F^- < O^{2-} < N^{3-}$
(3) Na < Li < K
(4) $Fe^{3+} < Fe^{2+} < Fe^{4+}$

72. The ionic radii of N^{3-}, O^{2-} and F^- are respectively given by:
(1) 1.36, 1.40, 1.71
(2) 1.36, 1.71, 1.40
(3) 1.71, 1.40, 1.36
(4) 1.71, 1.36, 1.40

73. The number of elements present in fifth period are:
(1) 18
(2) 32
(3) 8
(4) 24

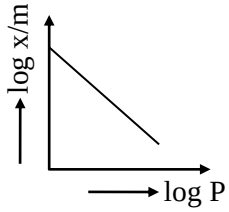
74. Which of the following is arranged in decreasing order of size?
(1) $Mg^{2+} > Al^{3+} > O^{2-}$
(2) $O^{2-} > Mg^{2+} > Al^{3+}$
(3) $Al^{3+} > Mg^{2+} > O^{2-}$
(4) $Al^{3+} > O^{2-} > Mg^{2+}$

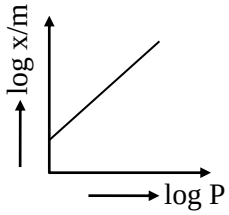
75. Which of the following is a property of physisorption?
(1) High specificity
(2) Irreversibility
(3) Non-specificity
(4) None of these

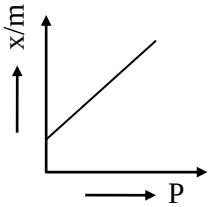
76. Which of the following is less than zero during adsorption?
(1) ΔG
(2) ΔS
(3) ΔH
(4) All the above

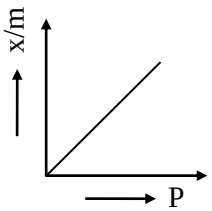
77. Which is an incorrect statement?
(1) Heat of physical adsorption is 20-40 kJ mol^{-1}
(2) Chemical adsorption is specific in nature
(3) Physical adsorption is reversible
(4) Physical adsorption takes place at very high temperature

78. Which gas is adsorbed easily at solid surface?
(1) SO_2
(2) H_2
(3) O_2
(4) N_2

79. For Freundlich adsorption isotherm which is a correct graph?
(1) 

(2) 

(3) 

(4) 

80. Which is not an application of adsorption?
(1) Purification of water by ion exchange
(2) To create vacuum
(3) Chromatographic analysis
(4) Artificial rain

81. Which method of preparation of sol involves chemical reaction?
(1) Hydrolysis
(2) Mechanical dispersion
(3) Exchange of solvent
(4) All of these

82. Which of the following represents associated colloidal particles?
(1) Starch (2) Gold sol
(3) Proteins (4) Soaps

83. Fixed parts of a colloidal solution of Agl are respectively $[Agl]I^-$ and $[Agl]Ag^+$ in presence of:
(1) Kl and $AgNO_3$
(2) $AgNO_3$ and Kl
(3) Kl and KlO_3
(4) $AgNO_3$ and $Ba(NO_3)_2$

84. Match the entries of column I with appropriate entries of column II and choose the correct option out of the four options:

	Column-I		**Column-I**
(A)	Fog	(p)	Gel
(B)	Milk	(q)	Foam
(C)	Cheese	(r)	Emulsion
(D)	Soap lather	(s)	Aerosol

(1) A-q, B-s, C-r, D-s
(2) A-s, B-r, C- p, D- q
(3) A- q, B-s, C-r, D-p
(4) A-r, B-s, C-q, D-p

85. Which property is observed in an emulsion?
(1) Tyndall effect
(2) Brownian motion
(3) Both (1) & (2)
(4) None of these

SECTION – B

86. A particular station of All India Radio, New Delhi, broadcasts on a frequency of 1,368 kHz (kilohertz). The wavelength of the electromagnetic radiation emitted by the transmitter is:
[speed of light, $c = 3.0 \times 10^8\ ms^{-1}$]
(1) 219.2 m (2) 2192 m
(3) 21.92 cm (4) 219.3 m

87. Suppose 10^{-17} J of energy is needed by the interior of human eye to see an object. How many photons of green light (λ = 550 nm) are needed to generate this minimum amount of energy?
(1) 14 (2) 28
(3) 39 (4) 42

88. Out of X-rays, infrared rays, visible rays and microwaves, the largest frequency is of
(1) X-rays (2) IR rays
(3) Visible rays (4) Microwaves

89. The increasing order (lowest first) for the values of e/m (charge/mass) for e, p, n, α are:
(1) $e < p < n < \alpha$ (2) $n < p < e < \alpha$
(3) $n < p < \alpha < e$ (4) $n < \alpha < p < e$

90. ($^{76}_{32}Ge$, $^{76}_{34}Se$) and ($^{30}_{14}Si$, $^{32}_{16}S$) are the examples of
(1) Isotopes and isobars
(2) Isobars and isotones
(3) Isotones and isotopes
(4) Isobars and isotopes

91. When the electrons of hydrogen atom return to L-shell from a shell of higher energy, we get a series of lines in the spectrum. This series is called:
(1) Balmer series (2) Lyman series
(3) Brackett series (4) Paschen series

92. Arrange Ce^{3+}, La^{3+}, Pm^{3+} and Yb^{3+} in increasing order of their ionic radii
(1) $Yb^{3+} < Pm^{3+} < Ce^{3+} < La^{3+}$
(2) $Ce^{3+} < Yb^{3+} < Pm^{3+} < La^{3+}$
(3) $Yb^{3+} < Pm^{3+} < La^{3+} < Ce^{3+}$
(4) $Pm^{3+} < La^{3+} < Ce^{3+} < Yb^{3+}$

93. Match the atomic numbers of the elements given in column I with the period number given in column II and mark the appropriate option.

	Column-I		**Column-II**
(A)	31	(p)	5
(B)	50	(q)	3
(C)	56	(r)	4
(D)	14	(s)	6

(1) A-p, B-q, C-r, D-s
(2) A- q, B-p,C-s,D-r
(3) A-r, B-s, C-p, D-q
(4) A-r, B-p,C-s,D-q

94. The radii of F, F^-, O and O^{2-} are in the order of:
(1) $O^{2-} > F^- > F > O$ (2) $F^- > O^{2-} > F > O$
(3) $O^{2-} > O > F^- > F$ (4) $O^{2-} > F^- > O > F$

95. Rate of physical adsorption increases with:
(1) Decrease in temperature
(2) Decrease in pressure
(3) Increase in temperature
(4) Decrease surface area

96. A small quantity of $FeCl_3$ is added to freshly prepared $Fe(OH)_3$ precipitate, when a reddish brown positively charged solution is formed. This phenomenon is called:
(1) Cataphoresis (2) Dialysis
(3) Emulsification (4) Peptisation

97. Rate of adsorption of gas is greater when pressure increased. The above statement is true for:
(1) For low range of pressure
(2) For high range of pressure
(3) For moderate range of pressure
(4) For every range of pressure

98. Gold number of starch is 25. How much of it is required to prevent coagulation of 100 ml of gold sol adding 1 ml of 10% NaCl solution?
(1) 25 mg (2) 250 mg
(3) 2.5 mg (4) 0.250 mg

99. Match the entries of column I with appropriate entries of column II and choose the correct option out of the four options:

	Column-I		**Column-II**
(A)	Electrophoresis	(p)	Movement of molecules of dispersion medium
(B)	Electro-osmosis	(q)	Determination of Avogadro's number
(C)	Tyndall effect	(r)	Ultramicroscope
(D)	Brownian motion	(s)	Determination of charge on colloidal particles

(1) A-s, B-p, C-r, D- q
(2) A- q, B-r,C-p,D-s
(3) A-p, B-r, C-s, D-q
(4) A-s, B- q,C-r,D-p

100. **Assertion (A):** Aqueous gold colloidal solution is red in colour.
Reason (R): The colour arises due to scattering of light by colloidal gold particles.
(1) Both assertion and reason are true, and reason is the true explanation of the assertion.
(2) Both assertion and reason are true, but reason is not the true explanation of the assertion.
(3) Assertion is true, but reason is false.
(4) Both assertion and reason are false.

Solution

51. (3)

NCERT XI, Part-I, Page 50

$\lambda = \frac{h}{p} \therefore \frac{\lambda_A}{\lambda_B} = \frac{p_B}{p_A} = \frac{1}{2}$

or $\lambda_B = 2 \times \lambda_A = 2 \times 5 \times 10^{-8}\ m = 10^{-7}\ m$

52. (2)

NCERT XI, Part-I, Page 41

$E = n\frac{hc}{\lambda} \Rightarrow n = \frac{E\lambda}{hc}$

$\text{Power} = \frac{\text{Energy (J)}}{\text{Time (s)}}$

53. (1)

NCERT XI, Part-I, Page 41

$E = \frac{hc}{\lambda}$

$\therefore E \propto \frac{1}{\lambda}$

54. (2)

NCERT XI, Part-I, Page 78

Moseley gave the modern periodic law. He showed that atomic number is more fundamental property of an element than its atomic mass. He found that the square root of the frequency of a line (of a X-Ray spectrum) is related to the atomic number (Z) of target material; as $\sqrt{\nu} = a(Z - b)$

55. (3)

NCERT XI, Part-I, Page 55

For hydrogen like species which contains only one electron, the energy of that electron is just dependent upon the value of principal quantum number '*n*'.

$\therefore$ All the orbitals in 2p subshell have same energy as value of '*n*' is same i.e., 2.

And number of orbitals in p subshell

$= 2l + 1 = 2(1) + 1 = 3$

56. (2)

NCERT XI, Part-I, Page 51

Heisenberg's uncertainty principle:

$\Delta x.\Delta p \geq \frac{h}{4\pi}$

57. (4)

NCERT XI, Part-I, Page 55

$l = 1$, p subshell $\Rightarrow$ Dumb-bell

$l = 0$, s subshell $\Rightarrow$ Spherical

$l = 2$, d subshell $\Rightarrow$ Double dumb-bell

$l = 3$, f subshell $\Rightarrow$ Complex

58. (3)

NCERT XI, Part-I, Page 50

$\lambda = \frac{h}{mv}$

$6.626 \times 10^{-29} = \frac{6.626 \times 10^{-34}}{10^{-3} v}$

$v = 10^{-2}$ m/sec

59. (4)

NCERT XI, Part-I, Page 55

For given value of 'n', the value of '*l*' must be from '0' to (n – 1). So for n = 1 '*l*' should be '0'.

60. (4)

NCERT XI, Part-I, Page 48

$n_2 = 8, n_1 = 2$

$\frac{1}{\lambda} = RZ^2\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$

$\frac{1}{\lambda} = R \cdot 1^2\left[\frac{1}{2^2} - \frac{1}{8^2}\right]$

$\frac{1}{\lambda} = R\left[\frac{1}{4} - \frac{1}{64}\right]$

$\frac{1}{\lambda} = R\left[\frac{16-1}{64}\right]$

$\frac{1}{\lambda} = R\frac{15}{64}$

$\lambda = \frac{64}{15R}$

61. (1)

NCERT XI, Part-I, Page 63

In degenerate orbitals electrons are filled according to Hund's rule of maximum multiplicity.

62. (2)

NCERT XI, Part-I, Page 42

K.E. = $h\nu - h\nu_0$

Metals with lower value of ν_0 have higher KE.

63. (1)

NCERT XI, Part-I, Page 42

$E_0 = 4.7 \times 10^{-19}$ J

$E_0 = \frac{4.7 \times 10^{-19}}{1.6 \times 10^{-19}}\text{eV} = 2.9375\ \text{eV}$

KE = $E_0 - \phi$ = 2.9375 – 2.02

= 0.9175 eV

64. (4)

NCERT XI, Part-I, Page 86

On moving down the group the atomic radius of Ga is slightly lower than that of Al. This is due to the presence of d - electrons in Ga which do not shield the nucleus effectively. As a result, the electrons in Ga experience greater force of attraction by the nucleus than in Al. Thus, option 4 represents the correct order of atomic radii for group 13 elements.

65. (1)

NCERT XI, Part-I, Page 89

The screening effect of electrons of different orbitals follows the order: s > p > d > f.

66. (4)

NCERT XI, Part-I, Page 82, 84

$1s^2 2s^2 2p^6 3s^2 3p^1$ is p-block element. p-block elements are also called as representative element.

67. (1)

NCERT XI, Part-I, Page 86

$r_{\text{van der waal}} > r_{\text{metallic}} > r_{\text{covalent.}}$

68. (4)

NCERT XI, Part-I, Page 84

Electronic configuration: $[Kr]4d^{10}\ 4f^{14},\ 5s^2\ 5p^6,\ 6s^2$

	n	l	$(n + l)$
4d	4	2	6
4f	4	3	7
5s	5	0	5
5p	5	1	6
6s	6	0	6

Last electron goes in the subshell which has highest value of $(n + l)$. So last electron goes into 4f subshell, so the given element is f-block.

69. (4)

NCERT XI, Part-I, Page 81

N^+ has total '6' electrons which are equal to no. of electrons in carbon. So N^+ and C are isoelectronic.

70. (3)

NCERT XI, Part-I, Page 86

As we move down in a group, radii increases but Zr and Hf have almost same radius due to poor shielding of f- electrons in Hf.

71. (2)

NCERT XI, Part-I, Page 87

F^-, O^{2-}, N^{3-} are isoelectronic

$$\text{Size of isoelectronic species} \propto \frac{1}{\text{No. of protons}}$$

72. (3)

NCERT XI, Part-I, Page 87

Ionic radius of isoelectronic species

$$\propto \frac{1}{\text{Number of protons}}$$

$(r_{N^{3-}} > r_{O^{2-}} > r_{F^-})$

73. (1)

NCERT XI, Part-I, Page 79

Period number = n

If n is odd,

number of elements in a period = $\frac{(n+1)^2}{2}$

If n is even,

number of elements in a period = $\frac{(n+2)^2}{2}$

For n = 5,

number of elements = $\frac{(5+1)^2}{2} = \frac{36}{2} = 18.$

74. (2)

NCERT XI, Part-I, Page 87

Size of isoelectronic species $\propto$ -ve charge $\propto \frac{1}{+\text{ve charge}}$

75. (3)

NCERT XII, Part-I, Page 125

Physisorption is not specific in nature.

76. (4)

NCERT XII, Part-I, Page 125

Adsorption is a spontaneous, exothermic process with decrease in entropy, hence ΔG = –ve, ΔH = –ve and ΔS = –ve.

77. (4)

NCERT XII, Part-I, Page 124

Physical adsorption is favourable at low temperature. It decreases with increase of temperature.

78. (1)

NCERT XII, Part-I, Page 124, 125

Rate of adsorption $\propto$ ease of liquification.

79. (2)

NCERT XII, Part-I, Page 127

$$\log\frac{x}{m} = \log k + \frac{1}{n}\log P$$

Compare with y = c + mx

It is a straight line graph with intercept = log k and slope = $\frac{1}{n}$

80. (1)

NCERT XII, Part-I, Page 128, 129

Purification of water by its exchange is not an application of adsorption.

81. (1)

NCERT XII, Part-I, Page 139

In hydrolysis new products/compounds/ions are formed.

82. (4)

NCERT XII, Part-I, Page 138

Synthetic detergents and soaps are the example of associated colloids.

83. (1)

NCERT XII, Part-I, Page 143

When $AgNO_3$ solution is added to KI solution the precipitated AgI adsorbs iodide ions from the dispersion medium and negatively charged colloidal sol is obtained.

When KI solution is added to $AgNO_3$ solution then positively charge sol is obtained due to adsorption of Ag^+ ion which is common ion.

84. (2)

NCERT XII, Part-I, Page 136

Fog	-	Aerosol
Milk	-	Emulsion
Cheese	-	Gel
Soap lather	-	Foam

85. (3)

NCERT XII, Part-I, Page 141

Emulsions shows both Tyndall effect and Brownian motion.

86. (4)

NCERT XI, Part-I, Page 39

$$\lambda = \frac{c}{v}$$

$$\lambda = \frac{3\times10^8}{1368\times10^3} = 219.298 \text{ m} = 219.3 \text{ m}$$

87. (2)

NCERT XI, Part-I, Page 41

$$E = \frac{n\times h\times c}{\lambda}$$

$$n = \frac{E\lambda}{hc} = \frac{10^{-17}\text{ J}\times550\times10^{-9}\text{ m}}{6.626\times10^{-34}\times3\times10^8} = 27.6 \approx 28$$

88. (1)

NCERT XI, Part-I, Page 38

Order of frequency:

γ-rays > X-rays > UV > Visible > IR > Microwaves > Radiowaves.

89. (4)

NCERT XI, Part-I, Page 31

Particle	Specific Charge (e)	Mass (u)	e/m
neutron (n)	0	1	0
alpha (He^{2+})	2	4	1/2
Proton	1	1	1
Electron	1	1/1837	1837

90. (2)

NCERT XI, Part-I, Page 35

Isobars are the atoms of different elements having the same mass number but different atomic number. Therefore $^{76}_{32}Ge$ and $^{76}_{34}Se$ are isobars

No. of neutrons = Mass number – Atomic number

For $^{30}_{14}Si$, $n = 30 - 14 = 16$

For $^{32}_{16}S$, $n = 32 - 16 = 16$

Both are atoms of different element with same number of neutrons but different mass number.

$\therefore$ Both are isotones

91. (1)

NCERT XI, Part-I, Page 45

The series is called Balmer series.

92. (1)

NCERT XI, Part-I, Page 86, 87

The correct option is 1.

$Yb^{3+} < Pm^{3+} < Ce^{3+} < La^{3+}$

Due to Lanthanoid contraction order will be

$Yb^{3+} < Pm^{3+} < Ce^{3+} < La^{3+}$

93. (4)

NCERT XI, Part-I, Page 83

Atomic number	Electronic configuration	Period
14	2, 8, 4	3
31	2, 8, 8, 13	4
50	2, 8, 8, 18, 14	5
56	2, 8, 8, 18, 18, 2	6

94. (4)

NCERT XI, Part-I, Page 87

Size of O^{2-} is greater than F^- and size of 'O' is greater than 'F'.

95. (1)

NCERT XII, Part-I, Page 126

Physical adsorption is favoured by low temperature and with increase of temperature, it decreases. While decrease of pressure cause desorption. Further, physical adsorption varies directly with surface area, i.e., higher the surface area, more will be the adsorption.

96. (4)

NCERT XII, Part-I, Page 140

The process of conversion of a fresh precipitate into colloids by shaking it with the dispersion medium in the presence of a small amount of suitable electrolyte is called peptisation and the electrolyte is called peptising agent.

Example: Colloids of $Fe(OH)_3$ is obtained by adding small quantity of $FeCl_3$ solution.

97. (1)

NCERT XII, Part-I, Page 127

Freundlich Adsorption isotherm.

98. (2)

NCERT XII, Part-I, Page 144

Gold number: Amount of starch in mg added to 10 ml saturated gold sol which prevents coagulation of gold on adding 1 mL of 10% NaCl solution.

Gold number = 25

i.e. 25 mg of starch is added to 10 ml gold sol

For 100 ml of gold sol, starch added $= \frac{25 \times 100}{10}$

= 250 mg

99. (1)

NCERT XII, Part-I, Page 141, 144

Follow the given process.

100. (1)

NCERT XII, Part-I, Page 142

The colour is due to scattering. It depends upon the size of particles. Finest gold sol has red colour. As the size of the particles increases it became purple then blue and finally golden yellow.