Question Review

All

A steel metre scale is to be ruled so that millimeter interval are accurate within about 5×10^{-5} mm at a certain temperature. The maximum temperature variation allowable during ruling is (α of steel = $10 \times 10^{-6}/^{o}$c)

Not Attempted

- 2^0c
- 5^0c
- 7^0c
- 10^0c

EXPLANATIONS Report

66 % were correct!

$$\alpha = \frac{\Delta l}{l \Delta \theta}$$

$$\text{or, } \Delta\theta = \frac{5 \times 10^{-5}}{1 \times 10 \times 10^{-6}}$$

$$= 5^0\text{c}$$

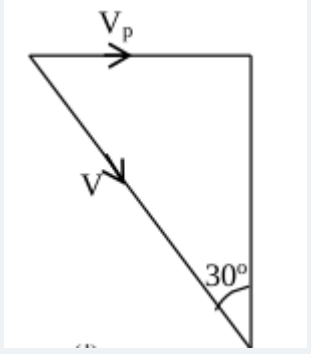
A man on the ground finds that when he sees a jet just over his head, the sound is heard at 30^0 with the vertical from his left. If the velocity of sound is v, the velocity of jet plane must be:

Not Attempted

- v/2
- 2v
- $\frac{\sqrt{3}}{2}$v
- $\frac{2}{\sqrt{3}}$v

EXPLANATIONS Report

49 % were correct!



$$\sin 30^\circ = \frac{V_p}{V}$$

$$\therefore V_P = \frac{V}{2}$$

An object is placed at 120cm form a glass lens of refractive index 1.56 with concave surface of radius 18cm and convex surface of radius 13.5cm. The magnification is

Not Attempted

- 1
- 2.5
- 3
- 4 ✓

EXPLANATIONS

Report

35 % were correct!

$$\frac{1}{f} = (\mu - 1)\left(-\frac{1}{R_1} + \frac{1}{R_2}\right)$$

$$= (1.56 - 1)\left(-\frac{1}{18} + \frac{1}{13.5}\right)$$

$$\therefore f = 96.4\text{cm}$$

$$m = \frac{f}{u - f} = \frac{96.4}{120 - 96.4} = 4$$

An electric dipole is placed inside a cube of side (a) The electric flux through cube is

Not Attempted

- zero ✓
- $\frac{q}{\varepsilon_0}$
- $\frac{2q}{\varepsilon_0}$

$\frac{2q}{\varepsilon_0 a^2}$

EXPLANATIONS Report

52 % were correct!

$$\phi = \frac{q_{net}}{\varepsilon_0} = \frac{+q - q}{\varepsilon_0} = 0$$

A source of 34V and 50Hz is connected in series with coil of 17mH and resistor of resistance 10 Ω. The Pd across coil is

Not Attempted

- 12V
- 16V
- 28V
- 32V

EXPLANATIONS Report

52 % were correct!

$$\mathrm{I} = \sqrt{\mathrm{R}^2 + \mathrm{X}_\mathrm{L}^2} = \sqrt{10^2 + (2\pi \mathrm{fL})^2} = 11.3\Omega$$
$$\mathrm{I} = \frac{\mathrm{V}}{\mathrm{Z}} = \frac{\mathrm{V}}{\mathrm{Z}} = \frac{34}{11.3} = 3\mathrm{A}$$
$$\mathrm{V} = \mathrm{IX}_\mathrm{L} = 3 \times 2\pi \mathrm{fL} = 3 \times 2\pi \times 50 \times 17 \times 10^{-3}$$
$$= 16\mathrm{V}$$

An iron rod of volume 10^{-4} m^3 and relative permeability 1000 is placed inside a long solenoid wound with 5 turns/cm. If a current of 0.5 A is passed through the solenoid, then the magnetic moment of the rod is

Not Attempted

- 10 Am^2
- 15 Am^2
- 20 Am^2
- 25 Am^2

EXPLANATIONS Report

33 % were correct!

We know that,

$$B = \mu_0 H + \mu_0 I \Rightarrow I = \frac{(B - \mu_0 H)}{\mu_0}$$

$$\therefore I = \left(\frac{\mu H - \mu_0 H}{\mu_0}\right) = \left(\frac{\mu}{\mu_0} - 1\right) H$$

$$\Rightarrow I = (\mu_r - 1)\, H = (\mu_r - 1)\,\mathrm{ni}$$

$$= (1000 - 1) \times 500 \times 0.5$$

$$= 2.5 \times 10^5 \mathrm{A/m}$$

$$M = I \cdot V = 2.5 \times 10^5 \times 10^{-4} \mathrm{Am}^2$$

$$= 25 \mathrm{Am}^2$$

Minium excitation potential of Bohr's first orbit in hydrogen atom is

Not Attempted

- 13.6 V
- 3.4 V
- 10.2 V
- 3.6 V

EXPLANATIONS Report

32 % were correct!

$$\mathrm{E_{min}} = \mathrm{E_2} - \mathrm{E_1} = \left(-13.6 + \frac{13.6}{4}\right)$$

$$= 10.2\mathrm{eV}$$

When boron ${}_5B^{10}$ is bombarded by neutron alpha particles are emitted. The resulting nucleus has the mass number

Not Attempted

- 11
- 7
- 6
- 15

EXPLANATIONS Report

36 % were correct!

$${}_5\mathrm{B}^{10} + \mathrm{n}^1 \longrightarrow {}_3\mathrm{X}^7 + {}_2\mathrm{He}^4 + \text{Energy}$$

Retarding potential of 3.38v is required to stop the emission of electron from metallic surface by radiation of 2000$\mathring{A}$. The threshold wavelength is

Not Attempted

- 2.2 × 10^{-7} m
- 2.4 × 10^{-7} m
- 4.4 × 10^{-7} m
- 8.4 × 10^{-7} m

EXPLANATIONS Report

67 % were correct!

$$\phi = \frac{hc}{\lambda} - KE$$

or, $\frac{hc}{\lambda_0} = \frac{hc}{\lambda} - ev_s$

or, $\lambda_0 = \frac{hc}{\left(\frac{hc}{\lambda} - ev_s\right)}$

$$= \frac{6.62 \times 10^{-34} \times 3 \times 10^8}{\left(\frac{6.62 \times 10^{-34} \times 3 \times 10^8}{2000 \times 10^{-10}} - 1.6 \times 10^{-19} \times 3.38\right)}$$

$= 4.4 \times 10^{-7} m$

100ml of 0.4N-HCl is mixed with 100ml of 0.6N of H_2SO_4. What is the normality of the resulting solution?

Not Attempted

- 0.5
- 0.2
- 0.3
- 0.4

EXPLANATIONS Report

74 % were correct!

100 ml of 0.4N HCl = 40 ml of 1N HCl

100 ml of 0.6N H_2SO_4 = 60 ml of 1N H_2SO_4

Equivalent addition = 100 ml of 1N acid

Since the total volume of solution after the addition of individual acids is 200 ml, so 100 ml of 1N acid = 200 ml of 0.5N acid.

Hence, the normality of the solution is 0.5N.

An electric current is passed through silver nitrate solution using silver electrodes. 10.79 g of silver was found to be deposited on the cathode if the same amount of electricity is passed through copper sulphate solution using copper electrodes, the weight of copper deposited on the cathode is

Not Attempted

- 6.4 g
- 2.3 g
- 12.8 g
- 3.2 g

EXPLANATIONS Report

38 % were correct!

In $AgNO_3$, Ag is in +1 oxidation state.

In $CuSO_4$, Cu is in +2 oxidation state.

Equivalent weight of $Ag = \frac{108}{1} = 108$

Equivalent weight of $Cu = \frac{63.6}{2} = 31.8$

Number of equivalents of silver formed = Number of equivalents of copper formed.

$$\frac{M_1}{M_2} = \frac{E_1}{E_2}$$

$$\frac{10.79}{M_{Cu}} = \frac{108}{31.8}$$

$$M_{Cu} = \frac{10.79 \times 31.8}{108} = 3.2\ gm.$$

Number of moles of $KMnO_4$ required to oxidize one mole of $Fe(C_2O_4)$ in acidic medium is

Not Attempted

- 0.6
- 0.167
- 0.2
- 0.4

EXPLANATIONS Report

19 % were correct!

Eq. of $KMnO_4$ = eq. of $Fe(C_2O_4)$

$x \times 5 = 1 \times 3$

$x = 0.6$

The ratio of amounts of H_2S needed to precipitate all the metal ions from 100 ml of 1 M $AgNO_3$ and 100 ml of 1 M $CuSO_4$ will be

Not Attempted

- 1:1
- 1:2
- 2:1
- None of these

EXPLANATIONS Report

50 % were correct!

$AgNO_3 \equiv 2Ag^+ + \underset{(H_2S)}{S^{2-}} \rightarrow Ag_2S$

$\because$ 2 mole $\rightarrow$ 1 mole [100 $\times$ 1 =100 millimole]

$\therefore$ 100 miliimole $\rightarrow$ 50 millimole H_2S required

$CuSO_4 \equiv Cu^{+2} + \underset{(H_2S)}{S^{2-}} \rightarrow CuS$

$\because$ 1 mole $\rightarrow$ 1 mole [100 $\times$ 1=100 millimole]

$\therefore$ 100 millimole $\rightarrow$ 100 millimole H_2S

required Ratio $\frac{50}{100} = \frac{1}{2}$.

The mass of $\mathrm{CaC_2O_4}$ (mol . wt = 128) that must be dissolved in 1.0 litre of pure water to make it a saturated solution (K_{sp} of $\mathrm{CaC_2O_4}$ = 2.5×10\(\)$^{-9}$) is

Not Attempted

- 6.4 × \(10\)$^{-3}$ gm
- 1.28 × \(10\)$^{-2}$gm
- 3.2× 10^{-3} gm
- 6.4× 10^{-2} gm

EXPLANATIONS Report

33 % were correct!

$CaC_2O_4 \rightleftharpoons Ca^{2+} + C_2O_4^{2-}$

$K_{sp} = x^2$

So, $x = \sqrt{2.5 \times 10^{-9}} = 5 \times 10^{-5}$

$$\frac{n}{V} = 5 \times 10^{-5}$$

$$\Rightarrow \frac{m}{128} = 5 \times 10^{-5}$$

$$\Rightarrow m = 6.4 \times 10^{-3}\,\text{gm}$$

Colour of iodine solution is disappeared by shaking it with aqueous solution of

Not Attempted

- H_2SO_4
- Na_2S
- $Na_2S_2O_3$ ✓
- Na_2SO_4

EXPLANATIONS Report

61 % were correct!

$2Na_2S_2O_3 + I_2 \rightarrow 2NaI + Na_2S_4O_6$

Compounds obtained by heating iodo ethane with KCN when completely hydrolysised gives out _____.

Not Attempted

- Ethane
- ethanol
- Ethanal
- propanoic acid ✓

EXPLANATIONS Report

65 % were correct!

When iodo ethane is warmed with an inorganic cyanide like potassium cyanide, ethyl cyanide is formed with is important because cyanide increase the number of carbon atoms in the molecule. When ethyl eyanide is further hydrolyze in acidic medium carboxylic acid is formed.

$$CH_3CH_2I + KCN \xrightarrow[-KI]{} CH_3CH_2CN \xrightarrow{H_2O/H^+} \underset{Propanoic\ acid}{CH_3CH_2COOH}$$

Passage

Diamond value is based on four characteristics: carat, color, clarity and cut. A diamond's size is measured by carat weight. There are 100 points in a carat and 142 carats in an ounce. Each point above 1 carat is more valuable than each point below 1 carat. Thus, a stone that weighs more than 1 carat is more valuable per point than a stone that is smaller than 1 carat.

The scale used for rating a diamond's color begins with "D", which means the stone is absolutely colorless and therefore most valuable "E" and "F" are almost colorless. All three are good for investment. A stone rated between "G" and "J" is good for jewelry. After that the stones take on a slightly yellowish color, which gets deeper as the grade declines.

The clarity of a stone is determined by its lack of carbon spots inner flaws, and surface blemishes. While most of these are invisible to the unaided eye, they do affect the diamond's brilliance. For jewelry, a diamond rated VVSI(very slight imperfections) is as close to flawless as one will find. After that the scale goes to VVS1.VSI, VS2, SI1, SI2,I1, I2 and so on.

The final characteristics are cut. When shaped (round, oval, emerald, marquise, pear, or heart), the diamond should be faceted so that light is directed into the depths of the prism and then reflected outward again. A well cut diamond will separate the light into different colors when the light is reflected. Only stones of similar shape should have their reflective qualities compared, as some shapes are more reflective than others. For example, the round shape is the most reflective.

The passage is mainly about

Not Attempted

- ○ The cost of diamonds
- ● Qualities affecting diamond values
- ○ How to judge an expensive diamond
- ○ Buying diamonds for jewelry.

What can be said about a 1 carat diamond?

Not Attempted

- ● It has 100 points.
- ○ It weights an ounce
- ○ It costs twice as much as a smaller one
- ○ It has the same quality as a half-carat diamond

The word "absolutely" in line 9 is closest in meaning to

Not Attempted

- ○ actually
- ○ positively
- ○ greatly
- ● completely

A stone that has no color at all is rated

Not Attempted

- A
- Z
- D
- J

It can be inferred from the passage that a stone rated “H” is

Not Attempted

- Good for jewelry
- Good for investment
- Very colorful
- Deep yellow

Clarity of stone

Not Attempted

- Is invisible to the unaided eye
- Affects the diamond’s brilliance.
- Has spots Flaws and blemishes
- Is determined by imperfections

The word “flawless” in the line 16 is closest in meaning to

Not Attempted

- unblemished
- unsaturated

- ○ unrefined
- ○ unbruised

All of the following rating refers to the clarity of a stone EXCEPT

Not Attempted

- ● perfection
- ○ very slight imperfection
- ○ slight imperfection
- ○ imperfection

It can be inferred from the passage that a diamond which is perfect is

Not Attempted

- ○ Not used for jewelry
- ● Rated VVSI
- ○ Very large
- ○ Invisible to the unaided eye

A diamond reflects

Not Attempted

- ○ the prism
- ○ the depths
- ○ faces
- ● light

The word “faceted” in the line 20 is closest in meaning to

Not Attempted

- split
- turned
- cut
- set

Two diamonds of the same shape

Not Attempted

- Have the same value
- Can be compared for reflective quality
- Are usually the same weight
- Are equally brilliant

Previous 1 2 3 4 5 Next