CHAPTER-01 ELECTRIC CHARGES & FIELDS

DPP-01

1. a) How many electrons are in 1C of negative charge?

b) Which is the true test of electrification: attraction or repulsion?

c) Can a body have a charge of 0.8×10^{-19} C?

2. An ebonite rod is rubbed with fur and is found to have a charge of -3.2×10^{-8} C on it.

a) Calculate the number of electrons transferred.

b) What is the charge on fur after rubbing?

3. How many megacoulombs of positive (or negative) charge are present in 2.0 mol of neutral hydrogen gas.

4. A polythene piece rubbed with wool is found to have a negative charge of 3×10^{-7} C.

a) Estimate the number of electrons transferred (from which to which)?

b) Is there a transfer of mass from wool to polythene?

5. Two identical conducting spheres, one having an initial charge +Q and the other initially uncharged, are brought into contact.

a) What is the new charge on each sphere?

b) While the spheres are in contact, a positively charged rod is moved close to one sphere, causing a redistribution of the charges on the two spheres, so the charge on the sphere closest to the rod has a charge –Q . What is the charge on the other sphere?

6. Two identical conducting spheres are charged by induction and then separated by a large distance; sphere-1 has charge +Q and sphere-2 has charge –Q. A third sphere is initially uncharged. If sphere-3 is touched to sphere-1 and separated and then touched to sphere-2 and separated, what is the final charge on each of the three spheres?

7. A table tennis ball covered with a conducting paint is suspended by a silk thread so that it hangs between two metal plates (see figure). One plate is earthed. When the other plate is connected to high voltage generator, what will happen to the ball.

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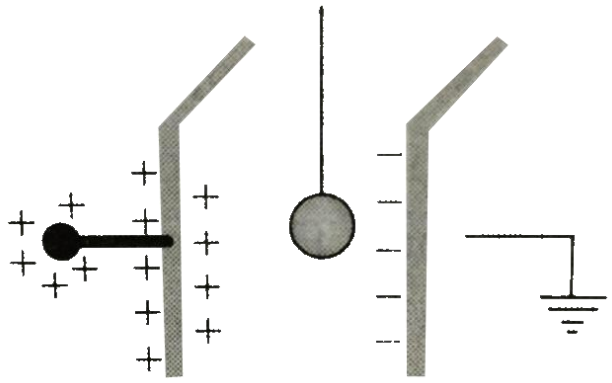
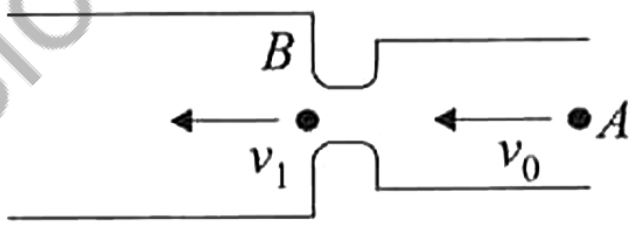


8. Five balls numbered 1 to 5 are suspended using separate threads. Pairs (1,2), (2,4) and (4,1) shows electrostatic attraction, while pair (2,3) and (4,5) show repulsion. Therefore ball 1 must be

a) Positively charged **b)** negatively charged

c) Neutral **d)** made of metal

9. The velocity of an electron at point A_1 is V_0 where cross sectional area is A. The velocity of electron at the end of contraction at point B, where cross sectional area is 2A, is V_1. Find the correct option:



a) $V_1 < V_0$

b) $V_1 = V_0$

c) $V_1 > V_0$

d) $V_1 = V_0/2$

10) A glass rod is rubbed with a silk cloth. The glass rod acquires a charge of $+19.2 \times 10^{-19}$ C.

a) Find the number of electrons lost by glass rod.

b) Find the negative charge acquired by silk.

c) Is there transfer of mass from glass to silk?

Given, $m_e = 9 \times 10^{-31}$ kg.

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Answers

1. **a)** 6.25×10^{18} **b)** Repulsion **c)** No
2. **a)** 2×10^{11} **b)** 3.2×10^{-8} C
3. 0.358
4. **a)** 1.875×10^{12} **b)** Yes; 1.7×10^{-18} kg
5. **a)** Q/2, Q/2 **b)** +2Q
6. Q/2, -Q/4, -Q/4
7. **"*Think More*"**
8. c)
9. c)
10. **a)** 12 **b)** -19.2×10^{-19} C. **c)** 1.08×10^{-29} kg.

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