

Concepts of electrostasis



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Why do you suppose this is so? -Outer electrons are loosely bound with the nucleus because of their larger distance from the nucleus, so they can be easily stripped off. In the case of the inner electrons, the opposite is true. They are more tightly bound because they are closer to the nucleus, so they are more difficult to remove them.

52) You are not harmed by contact with a charged metal ball, even though its voltage may be very high. Is the reason similar to why you are not harmed by the rather than 1 ICC sparks from a Fourth of July sparkler? Defend your answer in terms of the energies that are involved. Yes. The reason is similar, because the amount of energies involved in both cases is very small.

Chapter 23: Electric Current 46) In the circuit shown, how do the brightness's Of the identical lightships compare? Which bulb draws the most current? What will happen if Bulb A is unscrewed? If Bulb C is unscrewed? -The brightness of Bulb A and Bulb B will be the same, while Bulb C will be twice as Bulbs A or B. Bulb C draws the most current. When Bulb A is unscrewed, Bulb C will glow as it had and Bulb B will not glow. If Bulb C is unscrewed, Bulb A and Bulb B will glow at the same brightness.

Chapter 24: Magnetism 15) One way to make a compass is to stick a magnetized needle into a piece of cork and float it in a glass bowl full of water. The needle will align itself with the horizontal component of Earth's magnetic field. Since the north pole of this compass is attracted northward, will the needle float toward the north side of the bowl? Defend your answer. - The needle will point toward the northward direction; however, it will not even towards the northward side since the forces acting on the needle balances each other out, remaining at rest.

3) In a mass spectrometer, ions are

directed into a magnetic field, where they curve and strike a detector. If a variety of singly ionized atoms travel at the same speed through the magnetic field, would you expect them all to be deflected by the same amount, or would different ions be bent different amounts? Defend your answers. -Deflection of ions by magnetic fields solely depends upon their charge/ mass ratio. This is different for different ions. Chapter 25:

Electromagnetic Induction 2) A certain simple earthquake detector consists of a little box firmly anchored to Earth.

Suspended inside the box is a massive magnet that is surrounded by stationary coils of wire fastened to the box. Explain how this device works, applying two important principles of physics-? one studied in Chapter 2 and the other in this chapter. -When an earthquake occurs, stationary coils inside the detector begin to vibrate and a relative motion between the coils and magnets is generated. The motion of the coils induces voltage into the coils. As a result, the intensity of the earthquake is recorded.) A length of wire is bent into a closed loop and a magnet is plunged into it, inducing a voltage and, consequently, a current in the wire. A second length of wire, twice as long, is bent into two loops of wire, and a magnet is similarly plunged into it. Twice the voltage is induced, but the current is the same as that produced in the single loop. Why? -The voltage induced is directly proportional to the number of loops of the wire. Resistance is directly proportional to the length of the wire as long as all other parameters are constant in the formula $R = \rho L/A$.

The second wire has twice the length and twice the number of turns than the first wire. 43) The metal wing of an airplane acts like a " wire" flying through

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Earth's magnetic field. A voltage is induced between the wing tips, and a current flows along the wing but only for a short time. Why does the current stop even though the airplane continues to fly through Earth's magnetic field? -The current stops even though the airplane continues to fly through the Earth's magnetic field, because the losses which occurred when a motor operates a generator and when the voltage is stepped up by a transformer is not considered.

After the completion of each cycle, the energy outputted decreases due to the losses in the motor, the generator, and the transformer. Therefore, this will stop. Chapter 32: The Atom and the Quantum 6) Why does classical physics predict that atoms should collapse? -According to classical physics, an accelerated charged particle emits radiation. An electron that is orbiting the nucleus should radiate energy and move into a spiral path that ends at the nucleus. Therefore, atoms should collapse from a classical physics description. 28) When and where do Newton's laws of motion and quantum mechanics overlap?

When the size of the system is very large compared to the De Brogue wavelength, the Newton's laws of motion and quantum mechanics overlap. Chapter 33: The Atomic Nucleus and Radioactivity 16) Two protons in an atomic nucleus repel each other, but they are also attracted to each other. Explain. -Two protons in an atomic nucleus repel each other and also attract each other, because of Coulomb Repulsion. The protons repel each other; however, due to a strong nuclear force, they also attract each other. 47) Why is carbon dating ineffective in finding the ages of dinosaur bones?