Chapter 22 Electrostatics Practice

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) The fundamental force underlying all chemical reactions is 1) _____
A) gravitational.
B) nuclear.
C) centripetal.
D) electrical.
E) none of the above

2) A fundamental rule of electricity is that 2) _____
A) like kinds of charges repel.
B) unlike kinds of charges attract.
C) both of these
D) neither of these

3) The vast numbers of electrons in a coin don't fly off the surface because 3) _____
A) mutual repulsion is incomplete.
B) they are attracted by an equal number of protons.
C) they are strongly bonded to their atoms.
D) all of the above
E) none of the above

4) In an electrically neutral atom the number of protons in the nucleus is equal to the number of 4) _____
A) electrons that surround the nucleus.
B) neutrons in the nucleus.
C) both electrons and neutrons.
D) none of the above

5) Which of these does NOT have an electrical charge? 5) _____
A) proton
B) electron
C) neutron
D) all of the above
E) none of the above

6) Which of these has the greatest mass? 6) _____
A) proton
B) electron
C) both of these
D) neither of these

7) To say that electric charge is conserved means that no case has ever been found where 7) _____
A) the total charge on an object has changed.
B) quantity of negative charge on an object exactly balances positive charge.
C) the total quantity of charge on an object has increased.
D) net charge has been created or destroyed.
E) none of the above

8) To become a negative ion, an atom must 8) _____
A) lose an electron.
B) gain an electron.
C) lose a proton.
D) gain a proton.

9) If electrons are stripped from an atom it becomes a 9) _____

A) positive ion. B) negative ion.
C) different element. D) molecule.

10) It is said that electric charge is quantized, which means that the charge on an object 10) _____

A) may occur in an infinite variety of quantities.
B) is a whole-number multiple of the charge of one electron.
C) will interact with neighboring electric charges.
D) can be neither created nor destroyed.
E) is sometimes positive.

11) Two protons attract each other gravitationally and repel each other electrically. The stronger of these two forces is 11) _____

A) gravitation. B) electrical. C) neither of these

12) A main difference between gravitational and electric forces is that electrical forces 12) _____

A) attract.
B) repel or attract.
C) obey the inverse-square law.
D) act over shorter distances.
E) are weaker.

13) The electrical force between charges is strongest when the charges are 13) _____

A) close together. B) far apart.
C) either of these D) need more information

14) The electrical force between electric charges depends only on their 14) _____

A) magnitude. B) separation distance.
C) both of these D) neither of these

15) Particle A has twice the charge of nearby particle B. Compared to the force on Particle A, the force on Particle B is 15) _____

A) half as much.
B) the same.
C) twice as much.
D) four times as much.
E) none of the above

16) Two charges that are separated by one meter exert 1-N forces on each other. If the charges are pushed together so the separation is 25 centimeters, the force on each charge will be 16) _____

A) 1 N. B) 2 N. C) 4 N. D) 8 N. E) 16 N.

17) Two charges separated by one meter exert 1-N forces on each other. If the charges are pulled 3 meters apart, the force on each charge will be 17) _____

A) 0.11 N. B) 0.33 N. C) 0 N. D) 3 N. E) 9 N.

18) Two charges that are separated by one meter exert 1–N forces on each other. If the magnitude of each charge is doubled, the force on each charge is 18) _____

A) 1 N.
B) 2 N.
C) 4 N.
D) 8 N.
E) none of the above

19) Two charged particles repel each other with a force F. If the charge of one of the particles is doubled and the distance between them is halved, then the force will be 19) _____

A) F.
B) $2F$.
C) $F/2$.
D) $F/4$.
E) none of the above

20) Conducting materials are composed of atoms with 20) _____

A) strong cohesive forces between them.
B) loose outer electrons.
C) excess neutrons compared with protons.
D) vastly more charge than insulators.

21) A conductor differs from an insulator in that a conductor has more 21) _____

A) electrons than protons.
B) protons than electrons.
C) energy than an insulator.
D) faster moving molecules.
E) none of the above

22) A semiconductor can be 22) _____

A) a conductor. B) an insulator.
C) both of these D) neither of these

23) Superconductors are noted for their 23) _____

A) high electric resistance.
B) low electric resistance.
C) absence of electric resistance.
D) low cost.
E) bright colors.

24) Electrons can be transferred from one place to another by the process of 24) _____

A) friction.
B) contact, which means touching.
C) induction, which means non–touching.
D) all of the above
E) none of the above

25) If you comb your hair and the comb becomes positively charged, then your hair becomes 25) _____

A) positively charged. B) negatively charged. C) uncharged.

26) A negatively–charged rod is held near an aluminum can that rests on a dry wood table. If you momentarily touch the opposite side of the can with your finger, the can becomes 26) _____

A) positively charged.
B) negatively charged.
C) partially discharged.
D) completely discharged.
E) none of the above

27) A positive charge and a negative charge held a certain distance apart are released. As they move, the force on each particle 27) _____

A) increases. B) decreases. C) stays the same.

28) To say that an object becomes electrically polarized means that 28) _____

A) it is electrically charged.
B) its charges have been rearranged.
C) its internal electric field is zero.
D) it is only partially conducting.
E) none of the above

29) A common naturally–polarized bit of matter is 29) _____

A) an electron.
B) a hydrogen atom
C) a water molecule.
D) all of the above
E) none of the above

30) Before a thunder storm, clouds in the sky likely become 30) _____

A) conducting. B) polarized.
C) grounded. D) a field–free region.

31) When a car is struck by lightning, the resulting electric field inside the car is 31) _____

A) normally huge, but for a brief time.
B) small enough to be safe for a passenger inside.
C) zero.

32) The electrical force on a 2–C charge is 60 N. The electric field where the charge is located is 32) _____

A) 20 N/C.
B) 30 N/C.
C) 60 N/C.
D) 120 N/C.
E) 240 N/C.

33) Much of the charge on a conducting cube is 33) _____

A) uniformly spread over its surface. B) partly beneath the surface.
C) mutually repelled toward its corners. D) none of the above

34) Electric charge distributes itself on conducting surfaces 34) _____
A) with greater concentration on more curved parts.
B) such that the electric field inside is zero.
C) both of the above
D) none of the above

35) A reason for electric shielding inside a conductor is that any free electrons inside would 35) _____
A) not obey the inverse–square law.
B) cancel one another.
C) be set in motion until equilibrium is established, on the outside.
D) all of the above
E) none of the above

36) The direction of an electric field is the direction of the force exerted on 36) _____
A) a neutral test charge.
B) an electron.
C) an atom.
D) a proton.
E) a molecule.

37) The electric field between oppositely–charged parallel plates is 37) _____
A) uniform.
B) stronger at the ends.
C) composed of field lines in opposite directions.
D) none of the above

38) The electric field inside an uncharged metal ball is zero. If the ball is negatively charged, the electric field inside the ball is then 38) _____
A) less than zero. B) zero. C) greater than zero.

39) A proton and an electron are placed in an electric field. Which undergoes the greater acceleration? 39) _____
A) electron B) proton
C) both accelerate equally. D) none of the above

40) Electric potential, measured in volts, is the ratio of electric energy to the amount of electric 40) _____
A) current.
B) resistance.
C) charge.
D) voltage.
E) none of the above

41) If 10 J of work is used in pushing 1 C of charge into an electric field, its electric potential relative to its starting position is 41) _____
A) less than 10 V. B) 10 V.
C) more then 10 V. D) none of the above

42) Assume that 10 J of work pushes a charge initially at rest into an electric field. If the charge is then released, it flies back to its starting position with a kinetic energy of 42) _____

A) zero.
B) 5 J.
C) 10 J.
D) more than 10 J.
E) need more information.

43) Although the energy per coulomb of a high-voltage party balloon is high, the energy transfer that occurs if you touch it is low due to 43) _____

A) the relatively small amount of charge.
B) rubber being a poor conductor.
C) the small electric potential.
D) all of the above

Answer Key
Testname: CHAPTER 22 PRACTICE

1) D
2) C
3) B
4) A
5) C
6) A
7) D
8) B
9) A
10) B
11) B
12) B
13) A
14) C
15) B
16) E
17) A
18) C
19) E
20) B
21) E
22) C
23) C
24) D
25) B
26) A
27) A
28) B
29) C
30) B
31) C
32) B
33) C
34) C
35) C
36) D
37) A
38) B
39) A
40) C
41) B
42) C
43) A