Jan 21

Get Clickers

Announcements

First exam Next Wed.
Practice exam on website (under test info)
Review during Jana’s study session
Tangible: The Electric Table

- Looks like
- Size depends on metal
- Enter inside < E outside
- Insulator
Clickers:

What is the direction of the electric field at location C, due to the dipole?

A. 2
B. 4
C. 6
D. 8
E. 9
Q1

What is the direction of the electric field at the location of the point charge, due to the dipole?

A. 1
B. 3
C. 5
D. 7
E. 9
What is the direction of the electric force on the point charge, due to the dipole?

A. 1
B. 3
C. 5
D. 7
E. 9

\[ F = qE \]
Q3

A positive point charge causes a neutral molecule to polarize, as shown below. What is the direction of the electric force on the point charge, due to the induced dipole?

A. 1
B. 3
C. 5
D. 7
E. 9
Q4

A negatively charged ion is located to the left of a neutral molecule. Which diagram correctly shows the polarization of the neutral molecule?
A negative point charge causes a neutral molecule to polarize, as shown below. What is the direction of the electric force on the point charge, due to the induced dipole?

A. 1
B. 3
C. 5
D. 7
E. 9
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>A point charge is brought near a neutral molecule. (There is nothing else nearby). Is it possible for the point charge and the neutral molecule to repel each other?</td>
<td>B. No. The molecule can only polarize in a way that will attract the point charge.</td>
</tr>
</tbody>
</table>
Q7

| You observe that a tape is attracted to a negatively charged plastic pen. | A. The tape is positively charged.  
B. The tape is negatively charged.  
C. The tape is neutral.  
D. The tape could be positive or neutral.  
E. The tape could be positive, negative, or neutral. |
| --- | --- |
A positively charged tape is held near your hand.

Which diagram best shows the polarization of a molecule in your hand?

- A  
- B  
- C  
- D  
- E  
What is the direction of the force on the tape, due to the polarized molecules in your hand?

A. 1
B. 3
C. 5
D. 7
E. 9
Q10

Which diagram best shows the polarization of your blood by a negative tape?

A)  
B)  
C)  
D)
Q11
A glass of Gatorade is placed near a charged tape. Which diagram best shows the polarization of the Gatorade (which contains K⁺, Na⁺, Cl⁻, and other ions)?

A  B  C  D
Q12

What is the direction of the net electric field at location A, inside the Gatorade?

![Diagram of electric fields with arrows pointing in various directions]

A. 1
B. 3
C. 5
D. 7
E. 9

\[ \vec{E}_{\text{net}} = \vec{E}_{\text{tape}} + \vec{E}_{\text{Gatorade}} = 0 \]
Q13
In a region of space there is an electric field upward (in the +y direction), due to charges not shown in the diagram. A neutral copper block is placed in the region. Which diagram best describes the charge distribution on the block?
Q14
A negatively charged iron block is placed in a region where there is an electric field downward (in the \(-y\) direction) due to charges not shown. Which diagram best describes the charge distribution in and/or on the iron block?
Q15
A neutral copper block is polarized as shown, due to an electric field made by external charges (not shown). What is the direction of the \textbf{net electric field at location B}, which is inside the copper block?

A. 1  
B. 3  
C. 5  
D. 7  
E. 9

\[ \text{Diagram showing directions of electric field lines.} \]
Q16
A neutral copper block is located near two balls which have equal negative charges, as shown in the diagram. What is the direction of the net electric field at location A? Think carefully.

A. 2
B. 4
C. 6
D. 8
E. 9
Q17
A solid plastic ball has negative charge uniformly spread over its surface. Remember that the electric field inside a uniformly charged sphere, due to the charges on the sphere, is zero. Which diagram best shows the polarization of molecules inside the ball?

A

B

C

$E = 0$

No any polarization since $E$ inside
Q18

<table>
<thead>
<tr>
<th>A proton is placed at location B. You have calculated the electric field at location A, due to the proton.</th>
<th>To draw an arrow representing the electric field you calculated, what should you do?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A) Put the tail at A</td>
</tr>
<tr>
<td>B</td>
<td>B) Put the tail at B</td>
</tr>
</tbody>
</table>

Tail is at location where you calculate/measure the field.
Q19: A & B are identical metal blocks. What is the final charge of block B?

- Initially: A = +6 nC, B = neutral
- After touching: A = +3 nC, B = +3 nC

Choices:
A. +6 nC
B. +3 nC
C. 0 nC
D. -3 nC
E. -6 nC
Q20

A & B are identical metal blocks.

<table>
<thead>
<tr>
<th>Initially</th>
<th>What happens?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: +6 nC</td>
<td>A. protons move from A to B</td>
</tr>
<tr>
<td>B: neutral</td>
<td>B. positrons move from A to B</td>
</tr>
</tbody>
</table>

next, blocks touch

A. electrons move from B to A

final

D. both protons and electrons move

E. no charges move
Q21

<table>
<thead>
<tr>
<th>You neutralize a positively charged tape by running your finger across it.</th>
<th>What happens?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A. mobile electrons move from skin to tape</td>
</tr>
<tr>
<td></td>
<td>B. Cl⁻ ions move from skin to tape</td>
</tr>
<tr>
<td></td>
<td>C. protons move from tape to skin</td>
</tr>
<tr>
<td></td>
<td>D. + ions move from tape to skin</td>
</tr>
<tr>
<td></td>
<td>E. no charges move</td>
</tr>
</tbody>
</table>
Q22
Two aluminum blocks, A and B, are initially neutral. They have insulating handles, which are not shown. This sequence occurs:

At a time after t4, what is the net charge of A?
A) positive  B) negative  C) neutral
Tangible: Making a U tape
Lab: Sticky tape