Adv Topics L2 Syllabus Review Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What is the name of this course?
2. What is the name of your teacher?
3. List three of your five required daily materials:
	*
	*
	*
4. Identify and describe one of this course’s ethics:

	*
5. Who is your class partner?

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Adv Topics L3 DO NOW! Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. 2The Law of Conservation of charge states . . .
2. 2What is overall charge of the universe?

2Complete the following chart:

|  |  |  |
| --- | --- | --- |
| Subatomic Particle | Mass (in kg) | Charge (in Coulombs) |
| proton |  |  |
| neutron |  |  |
| electron |  |  |

1. 2Using fence–posting, calculate many electrons are in 2.00 g H2O:

Adv Topics L3 DO NOW! Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Adv Topics L4 DO NOW! Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. 3What is the formula for Coulomb’s Law?
2. 3Where is most of the mass located in an atom?
3. 3The proton is ­­­­­­­\_\_\_\_\_\_\_\_\_\_ times more massive than an electron.
4. 3What is Newton’s Second Law of Motion?
5. 3What is the overall charge of an atom?
6. 3Identify one way that electrons can move from one object to another.
7. 3What is the overall charge of a molecule?
8. 3What is the electronegativity difference between 2 atoms in a **nonpolar covalent** bond?
9. 3What is the electronegativity difference range between 2 atoms in a **polar covalent** bond?
10. 3What is the electronegativity difference between 2 atoms in an **ionic** bond?

Adv Topics L5-L6 DO NOW! Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. 5What is the formula for Coulomb’s Law?
2. 5What is the mathematical value for the permittivity of free space, ε0?
3. 5What is the mathematical value for the “k” constant?
4. 5How is the “k” constant mathematically related to ε0?

### Table 1 – Electronegativity Values

|  |
| --- |
|  H 2.1 C 2.5 N 3.0 O 3.5 F 4.0  Na 0.9 Mg 1.2 Si 1.8 P 2.1 S 2.5 Cl 3.0  Br 2.8  |

1. **6Types of Bonds:** Using the electronegativity values in Table 1 above, indicate whether each of the following bonds would be ionic (I), polar-covalent (P) or nonpolar-covalent (N).

	1. \_\_\_\_\_ Mg—Cl B. \_\_\_\_\_ P—N C. \_\_\_\_\_ Cl—Br
2. **6Dipole Moments:** For the following covalent bonds, indicate which end is slightly positive and which end is slightly negative by using an arrow. Use the electronegativity values in Table 1 above.

	1. N — P B. H — Br C. Cl — S
3. **6Intermolecular Forces:** Identify the strongest attractive force: Hydrogen Bonding (HB), Dipole-Dipole (DD), or London Dispersion (LD) that would occur between molecules of each of the following:

	1. \_\_\_\_\_ NH3 B. \_\_\_\_\_ SO2 C. \_\_\_\_\_ F2
4. 6Explain how temporary dipoles are formed in nonpolar covalent bonds.

Adv Topics L7 (Block Pt. 1) DO NOW! Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. 5What is the formula for Coulomb’s Law?
2. 5What is the mathematical value for the permittivity of free space, ε0?
3. 5What is the mathematical value for the “k” constant?
4. 5How is the “k” constant mathematically related to ε0?
5. 6In terms of *F*xyz, *φ*, and *θ*, define *F*x, *F*y, and *F*z.
	1. *F*x =
	2. *F*y =
	3. *F*z =
6. 2The Law of Conservation of charge states . . .
7. 3Identify one way that electrons can move from one object to another.
8. 2What is overall charge of the universe?
9. 3What is the overall charge of an atom?
10. 3What is the overall charge of a molecule?

2Complete the following chart:

|  |  |  |
| --- | --- | --- |
| Subatomic Particle | Mass (in kg) | Charge (in Coulombs) |
| proton |  |  |
| neutron |  |  |
| electron |  |  |

1. 3Where is most of the mass located in an atom?
2. 3The proton is ­­­­­­­\_\_\_\_\_\_\_\_\_\_ times more massive than an electron.
3. 3How does Newton’s Second Law of Motion apply to protons and electrons?

### Table 1 – Electronegativity Values

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Adv Topics L8 (Block Pt. 2) DO NOW! Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. In a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, charge flows easily. These are generally made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. In a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, almost no charge flows.
3. All atoms want to have an electron configuration of a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. Metals lose an electron or electrons because . . . (Provide an example)

1. Nonmetals gain an electron or electrons because . . . (Provide an example)

Identify the following as a conductor (C), insulator (I), or semiconductor (S).

1. Sb \_\_\_\_\_\_
2. As \_\_\_\_\_\_
3. Al \_\_\_\_\_\_
4. Se \_\_\_\_\_\_
5. H \_\_\_\_\_\_
6. O \_\_\_\_\_\_
7. N \_\_\_\_\_\_
8. Rh \_\_\_\_\_\_
9. Ni \_\_\_\_\_\_
10. Nd \_\_\_\_\_\_
11. Np \_\_\_\_\_\_
12. Ge \_\_\_\_\_\_
13. Fe \_\_\_\_\_\_
14. Am \_\_\_\_\_\_
15. Ru \_\_\_\_\_\_
16. U \_\_\_\_\_\_

Adv Topics L9 DO NOW! Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Identify how the charge will move for the following examples:

 Before During After

**C**

Scenario #1:

–

–

–

–

–

**C**

**C**

–

**C**

Scenario #2:

–

–

–

–

–

–

**C**

**I**

**C**

Scenario #3:

–

–

–

–

–

–

**I**

**I**

**I**

Scenario #4:

–

–

–

–

–

–

**C**

**C**

**I**

Scenario #5:

–

–

–

–

–

–

**C**

**I**

Scenario #6:

**I**

–

–

–

–

–

–

**I**

**I**

Adv Topics L10 DO NOW! Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What are the various formulas for the electric field?
2. What equation relates the force to the electric field?
3. A proton is released in a uniform electric field, and it experiences an electric force of 1.0 **✕** 10-14 N toward the south. What is the magnitude and direction of the electric field?
4. What is the magnitude and direction of the electric force on an electron in a uniform electric field of strength 1240 N/C that points due west?

Adv Topics L10 DO NOW! Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Adv Topics L11 DO NOW! Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is the electric field at a point when the force on a 1.20 µC charge placed at that point is **F** = (3.0 **i** -5.0 **j**) **✕** 10-3 N?

Adv Topics L11 DO NOW! Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is the electric field at a point when the force on a 1.20 µC charge placed at that point is **F** = (3.0 **i** -5.0 **j**) **✕** 10-3 N?

Adv Topics L12 DO NOW! Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Explain how electrical induction occurs.

What would happen if . . .

1. a *negatively*-charged object was **allowed to touch** a metal faucet that was connected to ground and the faucet was chopped off with a super axe hacker...
	* 1. before the *negatively*-charged object was removed:
		2. after the *negatively*-charged object was removed:
2. a metal faucet that was connected to ground, the faucet was chopped off with a super axe hacker, a *negatively*-charged object was **allowed to touch** it, and the *negatively*-charged object was then removed:
3. a *negatively*-charged object was **brought near** a metal faucet that was connected to ground and the faucet was chopped off with a super axe hacker...
	* 1. before the *negatively*-charged object was removed:
		2. after the *negatively*-charged object was removed:
4. a metal faucet that was connected to ground, the faucet was chopped off with a super axe hacker, a *negatively*-charged object was **brought near** it, and the *negatively*-charged object was then removed:
5. a *positively*-charged object was **allowed to touch** a metal faucet that was connected to ground and the faucet was chopped off with a super axe hacker...
	* 1. before the *positively*-charged object was removed:
		2. after the *positively*-charged object was removed:
6. a metal faucet that was connected to ground, the faucet was chopped off with a super axe hacker, a *positively*-charged object was **allowed to touch** it, and the *positively*-charged object was then removed:
7. a *positively*-charged object was **brought near** a metal faucet that was connected to ground and the faucet was chopped off with a super axe hacker...
	* 1. before the *positively*-charged object was removed:
		2. after the *positively*-charged object was removed:
8. a metal faucet that was connected to ground, the faucet was chopped off with a super axe hacker, a *positivel*y-charged object was **brought near** it, and the *positively*-charged object was then removed:
9. a *negatively*-charged piece of plastic was **allowed to touch** a metal faucet that was connected to ground and the faucet was chopped off with a super axe hacker...
	* 1. before the *negatively*-charged piece of plastic was removed:
		2. after the *negatively*-charged piece of plastic was removed:
10. a *positively*-charged glass rod was **allowed to touch** a metal faucet that was connected to ground and the faucet was chopped off with a super axe hacker...
	* 1. before the *positively*-charged glass rod was removed:
		2. after the *positively*-charged glass rod was removed:

Adv Topics L13 DO NOW! Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Draw the electric field lines for the following scenarios:

Scenario #1:

 **+ –**

Scenario #2:

 **+ +**

Scenario #3:

 **+ – +**

Scenario #4:

 **+ –**

 **+ –**

 **+ –**

 **+ –**

 **+ –**

 **+ –**

 **+ –**

Adv Topics L14 DO NOW! Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Electrostatics Lab