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AP Chemistry A

1. **Atomic Sructure and Properties (25.00%)**

Learning Targets

1.1 **I can calculate quantities of a substance or its relative number of particles using dimensional analysis and the mole concept.**

Learning Target	Descriptor	Definition
4	Proficient	I can calculate quantities of a substance or its relative number of particles using dimensional analysis and the mole concept.
3	Developing	I can convert between mass, moles and molar mass.
2	Basic	I can connect average atomic mass and molar mass to understand number of particles used in reactions.
1	Minimal	I can communicate the mole concept
0	No Evidence	No evidence shown.

1.2 **I can explain the quantitive relationship between the mass spectrum of an element and the masses of the element's isotopes.**

Learning Target	Descriptor	Definition
4	Proficient	I can explain the quantitive relationship between the mass spectrum of an element and the masses of the element's isotopes.
3	Developing	I can determine the identity of isotopes and the AAM of the element.
2	Basic	I can intrepret data from a mass spectrum chart.
1	Minimal	I can understand mass spec data.
0	No Evidence	No evidence shown.

1.3 **I can explain the quantitative relationship between the elemental composition by mass and the empirical formula of a pure substance.**

Learning Target	Descriptor	Definition
4	Proficient	I can explain the quantitative relationship between the elemental composition by mass and the empirical formula of a pure substance.
3	Developing	I can determine empirical formulas from data.
2	Basic	I can calculate composition by mass.
1	Minimal	I can define an empirical formula.
0	No Evidence	No evidence shown.

1.4 **I can explain the quantitive relationship between the elemental composition by mass and the composition of substance in a mixture.**

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Learning Target	Descriptor	Definition
4	Proficient	I can explain the quantitive relationship between the elemental composition by mass and the composition of substance in a mixture.
3	Developing	I can use elemental analysis to determine atoms.
2	Basic	I can use elemental analysis to determine purity.
1	Minimal	I can define a formula unit.
0	No Evidence	No evidence shown.

1.5   I can represent the electron configuration of an element or ions of an element using the Aufbau principle.

Learning Target	Descriptor	Definition
4	Proficient	I can represent the electron configuration of an element or ions of an element using the Aufbau principle.
3	Developing	I can write electron configurations.
2	Basic	I can utilize coulomb's law to describe energy in an atom.
1	Minimal	I can decribe the charges in an atom.
0	No Evidence	No evidence shown.

1.6   I can explain the relationship between the photoelectron spectrum of an atom or ion and the electon configuration of the species and the interactions between the electrons and the nucleus.

Learning Target	Descriptor	Definition
4	Proficient	I can explain the relationship between the photoelectron spectrum of an atom or ion and the electon configuration of the species and the interactions between the electrons and the nucleus.
3	Developing	I can intrepret PES and determine ionization energy.
2	Basic	I can intrepret PES and determine electron configurations.
1	Minimal	I can understand photoelectron spectroscopy(PES).
0	No Evidence	No evidence shown.

1.7   I can explain the relationship between trends in atomic properties of elements and electronic structure and periodicity.

Learning Target	Descriptor	Definition
4	Proficient	I can explain the relationship between trends in atomic properties of elements and electronic structure and periodicity.

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Learning Target	Descriptor	Definition
3	Developing	I can explain the trends of electronegativity and electron affinity.
2	Basic	I can explain the trends of atomic radii and ionization energy.
1	Minimal	I can identify trends in the periodic table.
0	No Evidence	No evidence shown.

1.8 I can explain the relationship between trends in the reactivity of elements and periodicity.

Learning Target	Descriptor	Definition
4	Proficient	I can explain the relationship between trends in the reactivity of elements and periodicity.
3	Developing	I can determine what type of bond will form based on location.
2	Basic	I can determine if a bond will form based on location.
1	Minimal	I can determine valence electrons of the elements.
0	No Evidence	No evidence shown.

2. **Types of Chemical Bonds (25.00%)**

Learning Targets

2.1 I can explain the relationship between the type of bonding and the properties of the elements participating in the bond.

Learning Target	Descriptor	Definition
4	Proficient	I can explain the relationship between the type of bonding and the properties of the elements participating in the bond.
3	Developing	I can determine bond type based on bond properties.
2	Basic	I can associate bond properties with bond type.
1	Minimal	I can define electronegativity.
0	No Evidence	No evidence shown.

2.2 I can represent the relationship between potential energy and distance between atoms, based on factors that influence the interaction strength.

Learning Target	Descriptor	Definition
4	Proficient	I can represent the relationship between potential energy and distance between atoms, based on factors that influence the interaction strength.

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Learning Target	Descriptor	Definition
3	Developing	I can interpret potential energy from bond distance chart.
2	Basic	I can utilize coulomb's law to understand bond strength.
1	Minimal	I can determine bond order.
0	No Evidence	No evidence shown.

2.3 I can represent an ionic solid with a particulate model that is consistent with coulomb's law and the properties of the constituent ions.

Learning Target	Descriptor	Definition
4	Proficient	I can represent an ionic solid with a particulate model that is consistent with coulomb's law and the properties of the constituent ions.
3	Developing	I can build an ionic crystal lattice.
2	Basic	I can understand cations and anions and their relative strengths.
1	Minimal	I can define a crystal lattice.
0	No Evidence	No evidence shown.

2.4 I can represent a metallic solid and/or alloy using a model to show essential characteristics of the structure and interactions present in the substance.

Learning Target	Descriptor	Definition
4	Proficient	I can represent a metallic solid and/or alloy using a model to show essential characteristics of the structure and interactions present in the substance.
3	Developing	I can create a model of a metallic solid or alloy.
2	Basic	I can define a interstitial alloy.
1	Minimal	I can define a substitutional alloy.
0	No Evidence	No evidence shown.

2.5 I can represent a molecule with a lewis structure.

Learning Target	Descriptor	Definition
4	Proficient	I can represent a molecule with a lewis structure.
3	Developing	I can build a lewis structure
2	Basic	I can draw bonded and unbonded valence electrons.

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Learning Target	Descriptor	Definition
1	Minimal	I can identify bonded and unbonded pairs of valence electrons.
0	No Evidence	No evidence shown.

2.6 I can represent a molecule with a lewis diagram that accounts for resonance between equivalent structues or that uses formal charge to select between nonequivalent stuctures.

Learning Target	Descriptor	Definition
4	Proficient	I can represent a molecule with a lewis diagram that accounts for resonance between equivalent structues or that uses formal charge to select between nonequivalent stuctures.
3	Developing	I can draw resonance structures.
2	Basic	I can determine formal charge to prove correct lewis structure.
1	Minimal	I can define resonance structures.
0	No Evidence	No evidence shown.

2.7 I can explain structural properties of molecules and electrons properties of molecules.

Learning Target	Descriptor	Definition
4	Proficient	I can explain structural properties of molecules and electrons properties of molecules.
3	Developing	I can determine molecular geometry using VSEPR, Lewis diagrams and bond orders.
2	Basic	I can determine bond energies and bond lengths.
1	Minimal	I can predict hybridization and bond angles.
0	No Evidence	No evidence shown.

3. **Intermolecular Forces and Properties (25.00%)**

Learning Targets

3.1 I can explain the relationship between the chemical structures of molecules and the relative strength of their intermolecular forces.

Learning Target	Descriptor	Definition
4	Proficient	I can explain the relationship between the chemical structures of molecules and the relative strength of their intermolecular forces.
3	Developing	I can explain hydrogen bonding.
2	Basic	I can expain dipole dipole and ion dipole interactions

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Learning Target	Descriptor	Definition
1	Minimal	I can explain london dispersion forces.
0	No Evidence	No evidence shown.

3.2 I can explain the relationship among the macroscopic properties of a substance, the particulate-level structure of the substance, and the interactions between these particles.

Learning Target	Descriptor	Definition
4	Proficient	I can explain the relationship among the macroscopic properties of a substance, the particulate-level structure of the substance, and the interactions between these particles.
3	Developing	I can explain the properties of ionic solids.
2	Basic	I can explain the properties of molecular solids.
1	Minimal	I can explain the properties of metallic solids.
0	No Evidence	No evidence shown.

3.3 I can represent the differences between solid, liquid, and gas phases using a particulate-level model.

Learning Target	Descriptor	Definition
4	Proficient	I can represent the differences between solid, liquid, and gas phases using a particulate-level model.
3	Developing	I can represent solids and their interparticle interactions.
2	Basic	I can represent liquids and their constituent particles.
1	Minimal	I can represent gases and their collisions.
0	No Evidence	No evidence shown.

3.4 I can explain the relationship between the macroscopic properties of a sample of gas or mixture of gases using the ideal gas law.

Learning Target	Descriptor	Definition
4	Proficient	I can explain the relationship between the macroscopic properties of a sample of gas or mixture of gases using the ideal gas law.
3	Developing	I can calculate moles, volume, pressure and temperature with the ideal gas law.
2	Basic	I can calculate partial pressure using mole fractions.
1	Minimal	I can calculate partial pressures.
0	No Evidence	No evidence shown.

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5 I can explain the relationship between the motion of particles and the macroscopic properties of gases.

Learning Target	Descriptor	Definition
4	Proficient	I can explain the relationship between the motion of particles and the macroscopic properties of gases.
3	Developing	I can apply the kinetic molecular theory to the motion of particles.
2	Basic	I can intrepret data from Maxwell-Boltsmann chart.
1	Minimal	I can relate kinetic energy to mass and velocity.
0	No Evidence	No evidence shown.

3.6 I can explain the relationship among non-ideal behaviors of gases, interparticle forces, and/or volumes.

Learning Target	Descriptor	Definition
4	Proficient	I can explain the relationship among non-ideal behaviors of gases, interparticle forces, and/or volumes.
3	Developing	I can explain how IMFs change the interactions of gases.
2	Basic	I can decribe the properties that make gases behave non-ideal.
1	Minimal	I can explain real gases.
0	No Evidence	No evidence shown.

3.7 I can calculate the number of solute particles, volume, or molarity of solutions.

Learning Target	Descriptor	Definition
4	Proficient	I can calculate the number of solute particles, volume, or molarity of solutions.
3	Developing	I can calculate molarity.
2	Basic	I can determine moles of solute and volume of solvent.
1	Minimal	I can define solute, solvent and solution.
0	No Evidence	No evidence shown.

3.8 I can create particle models of components of solutions.

Learning Target	Descriptor	Definition
4	Proficient	I can create particle models of components of solutions.
3	Developing	I can illustrate how IMF's effect solubility and separation of mixtures.
2	Basic	I can represent interactions between compnents.
1	Minimal	I can represent concentrations of components.

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Learning Target	Descriptor	Definition
0	No Evidence	No evidence shown.

3.9 I can explain the relationship between the solubiilty of ionic and molecular compounds in aqueous and nonaqueous solvents, and the intermolecular interactions between particles.

Learning Target	Descriptor	Definition
4	Proficient	I can explain the relationship between the solubiilty of ionic and molecular compounds in aqueous and nonaqueous solvents, and the intermolecular interactions between particles.
3	Developing	I can explain the separation of solutions through chromatography.
2	Basic	I can explain the separation of solutions through distillation.
1	Minimal	I can describe chromatography and distillation.
0	No Evidence	No evidence shown.

3.10 I can explain the relationship between the solubility of ionic and molecular compounds in aqueous and nonaqueous solvents, and the intermolecular interactions between particles.

Learning Target	Descriptor	Definition
4	Proficient	I can explain the relationship between the solubility of ionic and molecular compounds in aqueous and nonaqueous solvents, and the intermolecular interactions between particles.
3	Developing	I can explain how IMF's effect solubilty of mixtures.
2	Basic	I can explain how IMF's effect seperation of mixtures.
1	Minimal	I can define soluble and miscible.
0	No Evidence	No evidence shown.

3.11 I can explain the relationship between a region of the electromagnetic spectrum and the types of molecular or electronic transitions associated with that region.

Learning Target	Descriptor	Definition
4	Proficient	I can explain the relationship between a region of the electromagnetic spectrum and the types of molecular or electronic transitions associated with that region.
3	Developing	I can predict light emissions by their energy transitions.
2	Basic	I can associate microwave, infrared and ultraviolet with their energy transitions.
1	Minimal	I can descibe spectroscopy.

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Learning Target	Descriptor	Definition
0	No Evidence	No evidence shown.

3.12 I can explain the properties of an absorbed or emitted photon in relationship to an electronic transition in an atom or molecule.

Learning Target	Descriptor	Definition
4	Proficient	I can explain the properties of an absorbed or emitted photon in relationship to an electronic transition in an atom or molecule.
3	Developing	I can calcute the energy of a photon using planck's equation.
2	Basic	I can calulate the wavelength or frequency of a photon.
1	Minimal	I can define a photon.
0	No Evidence	No evidence shown.

3.13 I can explain the amount of light absorbed by a solution of molecules or ions in relationship to the concentration, path length, and molar absorptivity.

Learning Target	Descriptor	Definition
4	Proficient	I can explain the amount of light absorbed by a solution of molecules or ions in relationship to the concentration, path length, and molar absorptivity.
3	Developing	I can calculate the concentration of a solution with spectroscopy.
2	Basic	I can explain how concentration absorbs light.
1	Minimal	I can define molar absorptivity and absorbance.
0	No Evidence	No evidence shown.

4. Chemical Reactions (25.00%)

Learning Targets

4.1 I can identify evidence of chemical and physical changes in matter.

Learning Target	Descriptor	Definition
4	Proficient	I can identify evidence of chemical and physical changes in matter.
3	Developing	I can list evidence of a chemical change.
2	Basic	I can describe chemical changes.
1	Minimal	I can describe physical changes.

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Learning Target	Descriptor	Definition
0	No Evidence	No evidence shown.

4.2 I can represent changes in matter with a balanced chemical or net ionic equation.

Learning Target	Descriptor	Definition
4	Proficient	I can represent changes in matter with a balanced chemical or net ionic equation.
3	Developing	I can write a net ionic equation.
2	Basic	I can symbolical represent a balanced chemical reaction.
1	Minimal	I can identify parts of a chemical equation.
0	No Evidence	No evidence shown.

4.3 I can represent a given chemical reaction or physical process with a consistent particle model.

Learning Target	Descriptor	Definition
4	Proficient	I can represent a given chemical reaction or physical process with a consistent particle model.
3	Developing	I can create a particle model form chemical equation.
2	Basic	I can represent chemical and physical processes in model.
1	Minimal	I can identify particles in model.
0	No Evidence	No evidence shown.

4.4 I can explain the relationship between macroscopic charcteristics and bond interactions for chemical and physical processes.

Learning Target	Descriptor	Definition
4	Proficient	I can explain the relationship between macroscopic charcteristics and bond interactions for chemical and physical processes.
3	Developing	I can explain the bonds breaking and forming in chemical processes.
2	Basic	I can explain the bonds breaking and forming in physical processes.
1	Minimal	I can identify bonds forming and breaking.
0	No Evidence	No evidence shown.

4.5 I can explain changes in the amounts of reactants and products based on the balanced reaction equation for a chemical process.

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Learning Target	Descriptor	Definition
4	Proficient	I can explain changes in the amounts of reactants and products based on the balanced reaction equation for a chemical process.
3	Developing	I can calculate mass, moles, and volume through stoichiometry.
2	Basic	I can describe the law of conservation of mass and how it effects reactants and products.
1	Minimal	I can determine mole ratios.
0	No Evidence	No evidence shown.

Submitted on 8/9/2021 by