California Science

Chemistry

Identifying the phenomenon to be investigated HS-PS1-3	PS1-31a.	**a. Students describe the phenomenon under investigation, which includes the following idea: the relationship between the measurable properties (eg., melting point, boiling point, vapor pressure, surface tension) of a substance and the strength of the electrical forces between the particles of the substance.** PS1-31A
Identifying the evidence to answer this question	PS1-32a.	**a. Students develop an investigation plan and describe the data that will be collected and the evidence to be derived from the data, including bulk properties of a substance(eg., melting point and boiling point, volatility, surface tension) that would allow inferences to be made about the strength of electrical forces between particles.** PS1-32A
	PS1-32b.	**b. Students describe why the data about bulk properties would provide information about strength of the electrical forces between the particles of the chosen substances, including the following descriptions:** PS1-32B
	PS1-32bi.	i. The spacing of the particles of the chosen substances can change as a result of the experimental procedure even if the identity of the particles does not change(e.g. when water is boiled the molecules are still present but further apart.) PS1-32BI
	PS1-32bii.	ii. Thermal (kinetic) energy has an effect on the ability of the electrical attraction between particles to keep the particles close together. Thus as more energy is added to the system, the forces of attraction between the particles can no longer keep the particles close together. PS1-32BII
	PS1-32biii.	iii. The patterns of interaction between particles at the molecular scale are reflected in the patterns of behavior at the macroscopic scale. PS1-32BIII
	PS1-32iv.	iv. Together, patterns observed at multiple scales can provide evidence of the causal relationships between the strength of the electrical forces between particles and the structure of substances at the bulk scale. PS1-32IV
Planning PS1-33	PS1-33a.	**a. In the investigation plan, students include:** PS1-33A

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PS1-33ai. i. A rationale for the choice of substances to compare and a description of the composition of those substances at the atomic molecular scale. PS1-33AI

PS1-33aii. ii. A description of how the data will be collected, the number of trials and the experimental set up and equipment required. PS1-33AII

PS1-33b. b. Students describe how the data will be collected, the number of trials, the experimental set up, and the equipment required. PS1-33B

Collecting PS1-34

PS1-34a. a. Students collect and record data-quantitative and/or qualitative-on the bulk properties of substances. PS1-34A

Refining PS1-35

PS1-35a. a. Students evaluate their investigation, including evaluation of: PS1-35A

PS1-35ai. i Assessing the accuracy and precision of the ata collected, as well as the limitations of the investigation; and PS1-35AI

PS1-35aii. ii The ability of hte data to provide the evidence required PS1-35AII

PS1-3b. b. If necessary, students refine the plan to produce more accurate, precise, and useful data. PS1-3B