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| CER | 0 | 1 | 2 | 3 |
| Claim:  A statement that answers the original question/problem. | Does not make a claim or makes an inaccurate claim.  E.g.: “The beads did not separate” or “The beads separated because they have the same density” | Makes an accurate but vague or incomplete claim.  E.g.: “The beads separate because of density” | Makes an accurate and complete claim.  E.g.: “The beads separate because of differences in density as well as ionic interactions.” |  |
| Evidence:  Scientific data that support the claim. | No evidence or only inappropriate evidence | General statement that includes little specific data  E.g.: “The green separates into blue” | Provides appropriate but insufficient data  E.g.: “The beads separate and then come together.” | Provides appropriate and sufficient data.  E.g.: “We observed that the beads went to opposite sides but then slowly regrouped over time.” |
| Reasoning:  A justification that connects the evidence to the claim using appropriate and sufficient scientific concepts. | No reasoning or only inappropriate reasoning.  E.g.: “the negative electrons attract the positive electrons of another substance which causes them to dissolve” | Repeats evidence and links it to the claim, but does not include a complete description of the science concepts.  E.g.: “The beads separated because the blue beads were initially more dense and the white beads were less dense.”  --students only reference density of the beads | Provides 2 of the following 3 concepts:   * Density affects whether a substance floats or sinks. * Solubility is affected by intermolecular attractions. * The intermolecular attraction between polar water molecules and the dissolved ions of a salt is greater than the dipole-dipole attraction between water molecules and alcohol molecules.   E.g.: “The beads separated initially because the white beads had a greater density than the blue beads then they came together because the salt water separated from the alcohol since salt is more soluble in water than alcohol is in water.” | Provides 2 of the following 3 concepts:   * Density affects whether a substance floats or sinks. * Solubility is affected by intermolecular attractions. * The intermolecular attraction between polar water molecules and the dissolved ions of a salt is greater than the dipole-dipole attraction between water and alcohol molecules.   E.g.: “In addition to having different densities, the beads separate because the partially positive hydrogens in water molecules attract to the negative chloride ions, and the partially negative oxygens in water molecules attract to the positive sodium ions. The resulting salt water solution ~~dissolved with the water~~ is more dense than the alcohol left over, so the salt water sinks to the bottom and leaves the alcohol at the top. The reason the salt dissolves in the water and not the alcohol is because water is more polar, ~~while alcohol is only partly polar~~, so the ions are more strongly attracted to the water molecules.” |

Figure 6. Claim, Evidence, Reasoning (CER) rubric with example student responses, modified from McNeil & Krajcik (2012).