Isotopes in a sample

Atomic identity | constructed isotope data

Instructional alignment Standard 4 / Key Idea 3

Targets selected reasoning within the named code. Review the full standard and any assessment boundary before making a mastery or PLD claim.

1. 0.75(20)+0.25(22)=20.5 u.

2. Both have 10 protons. X-20 has 10 neutrons and X-22 has 12.

3. Neutron number and mass differ. Proton number and element identity stay the same.

One local criterion per numbered answer. Accept equivalent valid reasoning. Award the criterion only when the response supplies its requested evidence.

Interpret an error

Taking the unweighted mean of isotope masses or changing proton number. Check the actual response and ask a diagnostic question before assigning this interpretation.

Independent transfer

Change the abundance of X-22 to 50% and revise the mean.

Related public evidence

CHEM_LEG_2026_08_85 | public question

Official mapping for that example

CHEM_LEG_2026_08_84 | public question

Official mapping for that example

Original AI-assisted teaching stimulus; all numerical observations and named classroom settings are constructed

Count the electrons

Oxidation and reduction | half-reaction model

Instructional alignment Standard 4 / Key Idea 3

Targets selected reasoning within the named code. Review the full standard and any assessment boundary before making a mastery or PLD claim.

1. Mg -> Mg2+ + 2e-.

2. Oxidation is loss of electrons. Mg loses two.

3. The right side must total zero charge, so +2 requires two -1 electrons.

One local criterion per numbered answer. Accept equivalent valid reasoning. Award the criterion only when the response supplies its requested evidence.

Interpret an error

Balancing atoms while leaving electrical charge unbalanced. Check the actual response and ask a diagnostic question before assigning this interpretation.

Independent transfer

Write the reverse half-reaction and explain the classification.

Related public evidence

CHEM_LEG_2026_08_85 | public question

Official mapping for that example

CHEM_LEG_2026_08_84 | public question

Official mapping for that example

Original AI-assisted teaching stimulus; all numerical observations and named classroom settings are constructed

A gas model has a condition

Gas relationships | constructed gas data

Instructional alignment Standard 4 / Key Idea 3

Targets selected reasoning within the named code. Review the full standard and any assessment boundary before making a mastery or PLD claim.

1. V2=2.0(450/300)=3.0 L.

2. Kelvin is an absolute temperature scale used in this proportional gas model.

3. A change in amount or pressure requires accounting for those variables; the simple direct proportion is insufficient.

One local criterion per numbered answer. Accept equivalent valid reasoning. Award the criterion only when the response supplies its requested evidence.

Interpret an error

Using Celsius ratios in an absolute-temperature gas relationship. Check the actual response and ask a diagnostic question before assigning this interpretation.

Independent transfer

Hold volume fixed instead and compare the pressure ratio.

Related public evidence

CHEM_LEG_2026_08_85 | public question

Official mapping for that example

CHEM_LEG_2026_08_84 | public question

Official mapping for that example

Original AI-assisted teaching stimulus; all numerical observations and named classroom settings are constructed

The amount still dissolving

Dynamic equilibrium | constructed rate table

Instructional alignment Standard 4 / Key Idea 3

Targets selected reasoning within the named code. Review the full standard and any assessment boundary before making a mastery or PLD claim.

1. Forward and reverse changes continue while their effects on amounts cancel.

2. Forward and reverse rates are equal.

3. Concentrations depend on the system's equilibrium relationship. Equal rates can occur at unequal concentrations.

One local criterion per numbered answer. Accept equivalent valid reasoning. Award the criterion only when the response supplies its requested evidence.

Interpret an error

Describing equilibrium as both reactions stopping. Check the actual response and ask a diagnostic question before assigning this interpretation.

Independent transfer

Add reactant and describe the initial imbalance before a new equilibrium.

Related public evidence

CHEM_LEG_2026_08_85 | public question

Official mapping for that example

CHEM_LEG_2026_08_84 | public question

Official mapping for that example

Original AI-assisted teaching stimulus; all numerical observations and named classroom settings are constructed

A dilution with a final volume

Solutions and quantities | constructed preparation

Instructional alignment Standard 4 / Key Idea 3

Targets selected reasoning within the named code. Review the full standard and any assessment boundary before making a mastery or PLD claim.

1. n=2.0(0.025)=0.050 mol.

2. C=0.050/0.100=0.50 mol/L.

3. Molarity is amount per final solution volume. Added solvent volume alone is not the denominator.

One local criterion per numbered answer. Accept equivalent valid reasoning. Award the criterion only when the response supplies its requested evidence.

Interpret an error

Using 75 mL of added solvent as the final solution volume. Check the actual response and ask a diagnostic question before assigning this interpretation.

Independent transfer

Prepare the same final concentration using a different starting volume and justify the proportional relationship.

Related public evidence

CHEM_LEG_2026_08_85 | public question

Official mapping for that example

CHEM_LEG_2026_08_84 | public question

Official mapping for that example

Original AI-assisted teaching stimulus; all numerical observations and named classroom settings are constructed

Heat in an insulated cup

Energy transfer | constructed calorimetry

Instructional alignment Standard 4 / Key Idea 4

Targets selected reasoning within the named code. Review the full standard and any assessment boundary before making a mastery or PLD claim.

1. q=50(4.18)(6)=1254 J.

2. The metal loses 1254 J, or has q=-1254 J with the stated sign convention.

3. The cup or air can exchange heat, and measurements have uncertainty.

One local criterion per numbered answer. Accept equivalent valid reasoning. Award the criterion only when the response supplies its requested evidence.

Interpret an error

Using the final temperature as the temperature change. Check the actual response and ask a diagnostic question before assigning this interpretation.

Independent transfer

Double the water mass with the same energy input and predict the temperature rise.

Related public evidence

CHEM_LEG_2026_08_75 | public question

Official mapping for that example

CHEM_LEG_2026_08_65 | public question

Official mapping for that example

Original AI-assisted teaching stimulus; all numerical observations and named classroom settings are constructed