

A CONCENTRATION OF 120.9132 G OF MgO IN 3 L OF SOLUTION WILL BE WHAT MOLARITY (M)? (THE ATOMIC WEIGHT

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UNDERSTANDING MOLARITY AND ITS IMPORTANCE IN CHEMISTRY

MOLARITY (M) IS A FUNDAMENTAL CONCEPT IN CHEMISTRY THAT DESCRIBES THE CONCENTRATION OF A SOLUTE IN A GIVEN VOLUME OF SOLUTION. SPECIFICALLY, MOLARITY IS DEFINED AS THE NUMBER OF MOLES OF SOLUTE DISSOLVED IN ONE LITER OF SOLUTION. THIS MEASURE IS ESSENTIAL FOR STOICHIOMETRIC CALCULATIONS, PREPARING SOLUTIONS, AND UNDERSTANDING CHEMICAL REACTIONS.

INTRODUCTION TO MAGNESIUM OXIDE (MgO)

WHAT IS MgO?

MAGNESIUM OXIDE (MgO) IS AN INORGANIC COMPOUND CONSISTING OF MAGNESIUM AND OXYGEN. IT IS A WHITE, CRYSTALLINE SOLID THAT IS COMMONLY USED IN VARIOUS INDUSTRIAL APPLICATIONS, SUCH AS REFRACTORY MATERIALS, REFRACTORY BRICKS, AND AS A DIETARY SUPPLEMENT.

ATOMIC WEIGHT OF MgO

THE ATOMIC WEIGHTS OF THE ELEMENTS INVOLVED ARE:

- MAGNESIUM (Mg): APPROXIMATELY 24.305 g/mol
- OXYGEN (O): APPROXIMATELY 16.00 g/mol

THEREFORE, THE MOLAR MASS OF MgO IS CALCULATED AS:

$$\text{MOLAR MASS OF MgO} = 24.305 \text{ g/mol} + 16.00 \text{ g/mol} = 40.305 \text{ g/mol}$$

CALCULATING THE MOLARITY OF THE MgO SOLUTION

STEP 1: DETERMINE THE NUMBER OF MOLES OF MgO

GIVEN MASS OF MgO: 120.9132 GRAMS

USING THE MOLAR MASS OF MgO:

- $\text{NUMBER OF MOLES} = \text{MASS} / \text{MOLAR MASS}$

- NUMBER OF MOLES = $120.9132 \text{ g} / 40.305 \text{ g/mol}$

CALCULATING:

NUMBER OF MOLES $\approx 120.9132 / 40.305 \approx 3.0 \text{ mol}$

STEP 2: CONVERT THE VOLUME OF SOLUTION TO LITERS

GIVEN VOLUME OF SOLUTION: 3 LITERS

STEP 3: CALCULATE MOLARITY (M)

MOLARITY IS DEFINED AS:

$M = \text{MOLES OF SOLUTE} / \text{LITERS OF SOLUTION}$

SUBSTITUTING THE KNOWN VALUES:

$M = 3.0 \text{ mol} / 3 \text{ L} = 1 \text{ mol/L}$

FINAL ANSWER

THE MOLARITY OF THE MgO SOLUTION IS 1 M.

ADDITIONAL CONSIDERATIONS

SIGNIFICANCE OF ACCURATE ATOMIC WEIGHTS

ACCURATE ATOMIC WEIGHTS ARE CRUCIAL FOR PRECISE CALCULATIONS IN CHEMISTRY. SLIGHT VARIATIONS IN ATOMIC WEIGHTS CAN LEAD TO ERRORS IN MOLARITY CALCULATIONS, ESPECIALLY WHEN PREPARING SOLUTIONS FOR EXPERIMENTS THAT REQUIRE HIGH PRECISION.

IMPLICATIONS OF MOLARITY IN LABORATORY SETTINGS

- ENSURES REPRODUCIBILITY OF EXPERIMENTS
- FACILITATES STOICHIOMETRIC CALCULATIONS FOR REACTIONS
- HELPS IN PREPARING SOLUTIONS WITH DESIRED CONCENTRATIONS

COMMON MISTAKES TO AVOID

1. USING INCORRECT ATOMIC WEIGHTS FOR ELEMENTS
2. MIXING UNITS (E.G., MIXING GRAMS WITH MOLES WITHOUT CONVERSION)

3. INCORRECTLY CONVERTING VOLUME UNITS (E.G., MILLILITERS TO LITERS)

PRACTICAL APPLICATIONS OF MgO MOLARITY CALCULATIONS

CALCULATING MOLARITY IS ESSENTIAL IN SEVERAL PRACTICAL SCENARIOS INVOLVING MgO:

- PREPARING DIETARY SUPPLEMENTS WITH PRECISE MAGNESIUM CONTENT
- DESIGNING INDUSTRIAL PROCESSES WHERE MgO ACTS AS A REAGENT OR REFRACTORY MATERIAL
- CONDUCTING LABORATORY EXPERIMENTS REQUIRING SPECIFIC MgO CONCENTRATIONS

SUMMARY

IN SUMMARY, A SOLUTION CONTAINING 120.9132 G OF MAGNESIUM OXIDE (MgO) IN 3 LITERS OF SOLUTION HAS A MOLARITY OF APPROXIMATELY 1 MOL PER LITER (1 M). THIS CALCULATION HINGES ON KNOWING THE ATOMIC WEIGHTS OF MAGNESIUM AND OXYGEN, ACCURATELY DETERMINING THE MOLAR MASS OF MgO, AND APPLYING BASIC MOLARITY FORMULAS. MASTERY OF THESE CALCULATIONS IS FUNDAMENTAL FOR CHEMISTS AND LABORATORY TECHNICIANS TO ENSURE PRECISION AND CONSISTENCY IN THEIR WORK.

FURTHER READING AND RESOURCES

- [UNDERSTANDING MOLARITY: DEFINITIONS AND EXAMPLES](#)
- [PUBCHEM ENTRY FOR MAGNESIUM OXIDE](#)
- [MOLECULAR WEIGHT CALCULATOR](#)

BY MASTERING THE PROCESS OF CALCULATING MOLARITY, YOU CAN ENHANCE YOUR UNDERSTANDING OF SOLUTION CHEMISTRY AND IMPROVE THE ACCURACY OF YOUR EXPERIMENTAL PROCEDURES. REMEMBER, PRECISION IN INITIAL MEASUREMENTS AND CALCULATIONS IS KEY TO SUCCESS IN ANY CHEMICAL ENDEAVOR.

FREQUENTLY ASKED QUESTIONS

HOW DO YOU CALCULATE THE MOLARITY OF A SOLUTION GIVEN THE MASS OF MgO AND VOLUME?

TO CALCULATE MOLARITY, DIVIDE THE NUMBER OF MOLES OF MgO BY THE VOLUME OF SOLUTION IN LITERS. FIRST, CONVERT THE MASS OF MgO TO MOLES USING ITS MOLAR MASS, THEN DIVIDE BY THE VOLUME IN LITERS.

WHAT IS THE ATOMIC WEIGHT OF MAGNESIUM (Mg) AND OXYGEN (O) USED IN

CALCULATING MgO MOLAR MASS?

THE ATOMIC WEIGHT OF MAGNESIUM (Mg) IS APPROXIMATELY 24.305 g/mol, AND OXYGEN (O) IS APPROXIMATELY 16.00 g/mol, MAKING THE MOLAR MASS OF MgO ABOUT 40.305 g/mol.

HOW DO YOU FIND THE MOLARITY OF MgO IN A SOLUTION IF 120.9132 G ARE DISSOLVED IN 3 LITERS?

CALCULATE THE MOLES OF MgO BY DIVIDING 120.9132 g BY ITS MOLAR MASS (~40.305 g/mol), THEN DIVIDE THAT NUMBER BY 3 LITERS TO FIND THE MOLARITY.

WHAT IS THE APPROXIMATE MOLARITY OF MgO IN THIS SOLUTION?

FIRST, CONVERT GRAMS TO MOLES: $120.9132 \text{ g} \div 40.305 \text{ g/mol} \approx 3.0 \text{ mol}$. THEN, DIVIDE BY 3 L: $3.0 \text{ mol} \div 3 \text{ L} = 1.0 \text{ M}$. THE MOLARITY IS APPROXIMATELY 1.0 mol/L.

WHY IS UNDERSTANDING MOLAR MASS IMPORTANT WHEN CALCULATING SOLUTION MOLARITY?

MOLAR MASS ALLOWS YOU TO CONVERT MASS OF A SUBSTANCE INTO MOLES, WHICH IS ESSENTIAL FOR CALCULATING MOLARITY, THE CONCENTRATION OF A SOLUTION IN MOLES PER LITER.

CAN YOU EXPLAIN THE SIGNIFICANCE OF MOLARITY IN SOLUTION CHEMISTRY?

MOLARITY PROVIDES A STANDARDIZED WAY TO EXPRESS SOLUTION CONCENTRATION, ENABLING ACCURATE STOICHIOMETRIC CALCULATIONS AND REACTIONS IN CHEMISTRY.

WHAT ROLE DOES ATOMIC WEIGHT PLAY IN PREPARING SOLUTIONS LIKE MgO IN CHEMISTRY?

ATOMIC WEIGHT HELPS DETERMINE THE MOLAR MASS OF COMPOUNDS, WHICH IS CRUCIAL FOR CALCULATING THE PRECISE AMOUNT NEEDED TO PREPARE SOLUTIONS OF DESIRED MOLARITY.

IF THE MOLAR MASS OF MgO WAS SLIGHTLY DIFFERENT, HOW WOULD THAT AFFECT THE MOLARITY CALCULATION?

A DIFFERENT MOLAR MASS WOULD CHANGE THE NUMBER OF MOLES CALCULATED FROM THE GIVEN MASS, THUS AFFECTING THE FINAL MOLARITY VALUE. ACCURATE ATOMIC WEIGHTS ARE ESSENTIAL FOR PRECISE CALCULATIONS.

ADDITIONAL RESOURCES

A CONCENTRATION OF 120.9132 G OF MgO IN 3 L OF SOLUTION WILL BE WHAT MOLARITY (M)? (THE ATOMIC WEIGHT

UNDERSTANDING THE CONCENTRATION OF A CHEMICAL SOLUTION IS FUNDAMENTAL IN CHEMISTRY, WHETHER YOU'RE A STUDENT, RESEARCHER, OR INDUSTRY PROFESSIONAL. WHEN DEALING WITH SOLUTIONS, MOLARITY (M) IS A STANDARD MEASURE, REPRESENTING THE NUMBER OF MOLES OF SOLUTE DISSOLVED IN ONE LITER OF SOLUTION. IN THIS ARTICLE, WE DELVE INTO THE PROCESS OF CALCULATING THE MOLARITY OF MAGNESIUM OXIDE (MgO) WHEN A SPECIFIC MASS IS DISSOLVED IN A GIVEN VOLUME OF SOLUTION. WE'LL EXPLORE THE IMPORTANCE OF ATOMIC WEIGHTS, DETAIL THE CALCULATION STEPS, AND PROVIDE PRACTICAL INSIGHTS INTO THE CONCEPT.

WHAT IS MOLARITY AND WHY IS IT IMPORTANT?

MOLARITY (M) IS A UNIT OF CONCENTRATION THAT INDICATES HOW MANY MOLES OF A SOLUTE ARE PRESENT IN ONE LITER OF SOLUTION. FOR EXAMPLE, A 1 M SOLUTION CONTAINS ONE MOLE OF SOLUTE PER LITER.

WHY IS MOLARITY IMPORTANT?

- STANDARDIZATION: IT PROVIDES A STANDARDIZED WAY TO DESCRIBE SOLUTION CONCENTRATION.
- CHEMICAL REACTIONS: MANY REACTIONS DEPEND ON MOLAR RATIOS, MAKING MOLARITY ESSENTIAL FOR STOICHIOMETRIC CALCULATIONS.
- PREPARATION OF SOLUTIONS: ACCURATE MOLARITY ENSURES REPRODUCIBILITY AND PRECISION IN EXPERIMENTS.
- INDUSTRIAL APPLICATIONS: MOLARITY GUIDES MANUFACTURING PROCESSES, QUALITY CONTROL, AND FORMULATION.

UNDERSTANDING ATOMIC WEIGHT AND ITS ROLE IN CALCULATIONS

BEFORE CALCULATING MOLARITY, IT'S CRUCIAL TO UNDERSTAND THE ATOMIC WEIGHT (ATOMIC MASS) OF THE SOLUTE.

ATOMIC WEIGHT IS THE AVERAGE MASS OF ATOMS OF AN ELEMENT, EXPRESSED IN ATOMIC MASS UNITS (AMU), WHICH IS NUMERICALLY EQUIVALENT TO GRAMS PER MOLE (G/MOL).

FOR MAGNESIUM OXIDE (MgO):

- MAGNESIUM (Mg): ATOMIC WEIGHT ≈ 24.305 g/mol
- OXYGEN (O): ATOMIC WEIGHT ≈ 16.00 g/mol

THUS, THE MOLECULAR WEIGHT OF MgO IS:

$$\text{MgO} = \text{Mg} + \text{O} = 24.305 \text{ g/mol} + 16.00 \text{ g/mol} = 40.305 \text{ g/mol}$$

NOTE: THE PROBLEM STATES THE ATOMIC WEIGHT AS 120.9132 g, WHICH APPEARS TO BE A TYPO OR MISINTERPRETATION. LIKELY, THE INTENDED MOLECULAR WEIGHT OR MOLAR MASS FOR MgO SHOULD BE USED, WHICH IS APPROXIMATELY 40.305 g/mol.

IMPORTANT: ALWAYS VERIFY THE MOLECULAR WEIGHT FROM RELIABLE SOURCES, SUCH AS THE PERIODIC TABLE OR CHEMICAL DATABASES, BEFORE CALCULATIONS.

STEP-BY-STEP CALCULATION OF MOLARITY

GIVEN DATA:

- MASS OF MgO: 120.9132 GRAMS
- VOLUME OF SOLUTION: 3 LITERS

OBJECTIVE: FIND THE MOLARITY (M) OF THE SOLUTION.

STEP 1: CONVERT MASS TO MOLES

USING THE MOLECULAR WEIGHT OF MgO:

$$\left[\text{NUMBER OF MOLES} = \frac{\text{MASS OF MgO}}{\text{MOLECULAR WEIGHT OF MgO}} \right]$$

$$\left[\text{NUMBER OF MOLES} = \frac{120.9132 \text{ g}}{40.305 \text{ g/mol}} \right]$$

CALCULATING:

$$\left[\text{NUMBER OF MOLES} \approx 3.0 \text{ mol} \right]$$

STEP 2: CALCULATE MOLARITY

MOLARITY (M) IS DEFINED AS:

$$\left[\text{MOLARITY} = \frac{\text{MOLES OF SOLUTE}}{\text{VOLUME OF SOLUTION IN LITERS}} \right]$$

PLUGGING IN THE VALUES:

$$\left[M = \frac{3.0 \text{ mol}}{3 \text{ L}} = 1 \text{ M} \right]$$

RESULT:

THE MOLARITY OF THE MgO SOLUTION IS 1 M.

UNDERSTANDING THE SIGNIFICANCE OF CORRECT MOLECULAR WEIGHTS

THE CALCULATION HINGES ON ACCURATELY KNOWING THE MOLECULAR WEIGHT OF MgO. THE INITIAL CONFUSION WITH THE ATOMIC WEIGHT OF 120.9132 G SUGGESTS A POSSIBLE MISINTERPRETATION.

COMMON SOURCES OF ERROR INCLUDE:

- USING ATOMIC WEIGHTS INSTEAD OF MOLECULAR WEIGHTS.
- CONFUSING ATOMIC MASS WITH MOLECULAR MASS.
- TYPOGRAPHICAL ERRORS IN DATA INPUT.

CORRECT APPROACH:

- USE THE MOLECULAR WEIGHT OF MgO (APPROX. 40.305 g/mol).
- CROSS-VERIFY WITH PERIODIC TABLES OR CHEMICAL DATABASES.

THIS ENSURES THE MOLARITY CALCULATION IS PRECISE, ESPECIALLY CRITICAL IN LABORATORY AND INDUSTRIAL SETTINGS.

PRACTICAL IMPLICATIONS AND APPLICATIONS

CALCULATING THE MOLARITY OF MgO SOLUTIONS IS MORE THAN AN ACADEMIC EXERCISE—IT HAS REAL-WORLD RELEVANCE:

- INDUSTRIAL MANUFACTURING: MgO SOLUTIONS ARE USED IN REFRACTORY MATERIALS, CEMENT, AND AS A MAGNESIUM SUPPLEMENT.
- ENVIRONMENTAL CHEMISTRY: MgO CAN NEUTRALIZE ACIDS IN WASTEWATER TREATMENT.
- LABORATORY SYNTHESIS: PRECISE MOLARITY ENABLES REPRODUCIBLE EXPERIMENTS AND QUALITY CONTROL.

EXAMPLE SCENARIOS:

- PREPARING A MAGNESIUM OXIDE SOLUTION FOR TITRATION.
- CALCULATING THE REQUIRED MASS OF MgO TO ACHIEVE A SPECIFIC MOLARITY.
- DETERMINING THE CONCENTRATION OF EXISTING SOLUTIONS FOR QUALITY ASSURANCE.

ADDITIONAL CONSIDERATIONS IN SOLUTION PREPARATION

WHILE THE CALCULATION PROVIDES THE MOLARITY, PREPARING THE SOLUTION INVOLVES PRACTICAL STEPS:

- ACCURATE WEIGHING: USE PRECISE BALANCES TO MEASURE MgO .
- PROPER DISSOLUTION: MgO IS SLIGHTLY SOLUBLE IN WATER; STIRRING ENSURES UNIFORM DISTRIBUTION.
- VOLUME MEASUREMENT: USE VOLUMETRIC FLASKS FOR ACCURATE SOLUTION VOLUME.

NOTE: MgO 'S SOLUBILITY IN WATER IS LIMITED; IN SOME CASES, IT FORMS A SUSPENSION RATHER THAN A TRUE SOLUTION. FOR MOLARITY CALCULATIONS, THE ASSUMPTION IS THAT MgO HAS BEEN FULLY DISSOLVED OR THAT THE MOLAR CONCENTRATION RELATES TO THE INITIAL MASS DISSOLVED.

SUMMARY AND FINAL THOUGHTS

CALCULATING MOLARITY IS A FUNDAMENTAL SKILL IN CHEMISTRY, ESSENTIAL FOR UNDERSTANDING SOLUTION CONCENTRATIONS AND PERFORMING PRECISE REACTIONS. IN THE CASE OF 120.9132 GRAMS OF MgO DISSOLVED IN 3 LITERS OF SOLUTION, THE MOLARITY IS APPROXIMATELY 1 M, ASSUMING THE MOLECULAR WEIGHT OF MgO IS 40.305 g/mol.

KEY TAKEAWAYS:

- ALWAYS VERIFY MOLECULAR WEIGHTS BEFORE CALCULATIONS.
- CONVERT GRAMS TO MOLES USING MOLECULAR WEIGHT.
- DIVIDE MOLES BY VOLUME IN LITERS TO FIND MOLARITY.
- CONSIDER SOLUBILITY AND PRACTICAL ASPECTS WHEN PREPARING SOLUTIONS.

BY MASTERING THESE CALCULATIONS, CHEMISTS AND STUDENTS CAN ENSURE ACCURACY IN EXPERIMENTS, INDUSTRIAL PROCESSES, AND RESEARCH ENDEAVORS, ULTIMATELY ADVANCING SCIENTIFIC UNDERSTANDING AND APPLICATION.

IN CONCLUSION, UNDERSTANDING THE RELATIONSHIP BETWEEN MASS, MOLECULAR WEIGHT, AND VOLUME ALLOWS FOR PRECISE CONTROL OVER SOLUTION CONCENTRATIONS. WHETHER PREPARING SOLUTIONS FOR LABORATORY EXPERIMENTS OR INDUSTRIAL PRODUCTION, ACCURATE MOLARITY CALCULATIONS ARE INDISPENSABLE FOR SUCCESS IN CHEMISTRY.

A Concentration Of 120 9132 G Of Mgo In 3 L Of Solution Will Be What Molarity M The Atomic Weight

A Concentration Of 120 9132 G Of Mgo In 3 L Of Solution Will Be What Molarity M The Atomic Weight

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