

WORKSHEET CHEMICAL BONDING IONIC AND COVALENT

UNDERSTANDING WORKSHEET ON CHEMICAL BONDING: IONIC AND COVALENT BONDS

CHEMICAL BONDING IS A FUNDAMENTAL CONCEPT IN CHEMISTRY THAT EXPLAINS HOW ATOMS CONNECT TO FORM MOLECULES AND COMPOUNDS. IT INFLUENCES THE PHYSICAL AND CHEMICAL PROPERTIES OF SUBSTANCES, DETERMINING THEIR STABILITY, REACTIVITY, MELTING AND BOILING POINTS, SOLUBILITY, AND OTHER CHARACTERISTICS. IN EDUCATIONAL SETTINGS, WORKSHEETS ON CHEMICAL BONDING SERVE AS ESSENTIAL TOOLS TO HELP STUDENTS GRASP THE MECHANISMS BEHIND HOW ATOMS BOND, ESPECIALLY FOCUSING ON IONIC AND COVALENT BONDS. THESE WORKSHEETS TYPICALLY INCLUDE DIAGRAMS, QUESTIONS, EXERCISES, AND DIAGRAMS DESIGNED TO REINFORCE UNDERSTANDING, PROMOTE CRITICAL THINKING, AND DEVELOP PROBLEM-SOLVING SKILLS RELATED TO CHEMICAL BONDING.

OVERVIEW OF CHEMICAL BONDING

CHEMICAL BONDS ARE ATTRACTIVE FORCES THAT HOLD ATOMS TOGETHER IN A COMPOUND. THE PRIMARY TYPES OF CHEMICAL BONDS ARE IONIC AND COVALENT BONDS, EACH WITH DISTINCT CHARACTERISTICS, FORMATION MECHANISMS, AND PROPERTIES.

IONIC BONDING

IONIC BONDING OCCURS BETWEEN METAL AND NON-METAL ATOMS. IT INVOLVES THE TRANSFER OF ELECTRONS FROM ONE ATOM TO ANOTHER, LEADING TO THE FORMATION OF CHARGED PARTICLES CALLED IONS. THE ELECTROSTATIC ATTRACTION BETWEEN POSITIVELY CHARGED CATIONS AND NEGATIVELY CHARGED ANIONS RESULTS IN AN IONIC BOND.

COVALENT BONDING

COVALENT BONDING PRIMARILY OCCURS BETWEEN NON-METAL ATOMS. IT INVOLVES THE SHARING OF ELECTRON PAIRS BETWEEN ATOMS TO ACHIEVE A STABLE ELECTRON CONFIGURATION, OFTEN FOLLOWING THE OCTET RULE. COVALENT BONDS CAN BE SINGLE, DOUBLE, OR TRIPLE, DEPENDING ON THE NUMBER OF SHARED ELECTRON PAIRS.

IN-DEPTH ANALYSIS OF IONIC BONDING

FORMATION OF IONIC BONDS

IN IONIC BONDING, ATOMS TEND TO ATTAIN A STABLE ELECTRON CONFIGURATION, TYPICALLY A NOBLE GAS CONFIGURATION. METALS TEND TO LOSE ELECTRONS TO ACHIEVE A FULL OUTER SHELL, BECOMING POSITIVELY CHARGED IONS (CATIONS). NON-METALS TEND TO GAIN ELECTRONS TO COMPLETE THEIR OCTET, BECOMING NEGATIVELY CHARGED IONS (ANIONS).

PROCESS OF IONIC BOND FORMATION:

1. ELECTRON TRANSFER: METAL ATOMS LOSE ELECTRONS, AND NON-METAL ATOMS GAIN ELECTRONS.
2. FORMATION OF IONS: THIS ELECTRON TRANSFER RESULTS IN IONS WITH OPPOSITE CHARGES.
3. ELECTROSTATIC ATTRACTION: THE IONS ARE HELD TOGETHER BY STRONG ELECTROSTATIC FORCES, FORMING AN IONIC

COMPOUND.

CHARACTERISTICS OF IONIC COMPOUNDS

- HIGH MELTING AND BOILING POINTS: DUE TO STRONG ELECTROSTATIC FORCES.
- CRYSTALLINE STRUCTURE: USUALLY FORM CRYSTALLINE SOLIDS.
- SOLUBILITY: GENERALLY SOLUBLE IN WATER BUT INSOLUBLE IN NON-POLAR SOLVENTS.
- ELECTRICAL CONDUCTIVITY: CONDUCT ELECTRICITY WHEN MOLTEN OR DISSOLVED IN WATER.
- BRITTLINESS: TEND TO BREAK OR SHATTER UNDER STRESS.

EXAMPLES OF IONIC BONDS

- SODIUM CHLORIDE (NaCl)
- MAGNESIUM OXIDE (MgO)
- CALCIUM FLUORIDE (CaF_2)
- POTASSIUM BROMIDE (KBr)

WORKSHEET EXERCISES FOR IONIC BONDING

- IDENTIFY THE IONS: GIVEN A SET OF ELEMENTS, DETERMINE WHICH WILL FORM CATIONS AND WHICH WILL FORM ANIONS.
- ELECTRON TRANSFER DIAGRAM: DRAW DIAGRAMS SHOWING THE TRANSFER OF ELECTRONS BETWEEN METAL AND NON-METAL ATOMS.
- NAMING IONIC COMPOUNDS: WRITE THE CORRECT CHEMICAL NAMES FOR GIVEN FORMULAS.
- PROPERTIES MATCHING: MATCH IONIC COMPOUNDS WITH THEIR PROPERTIES.

IN-DEPTH ANALYSIS OF COVALENT BONDING

FORMATION OF COVALENT BONDS

COVALENT BONDS FORM WHEN ATOMS SHARE ELECTRONS TO COMPLETE THEIR OUTER ELECTRON SHELLS. THIS SHARING CAN BE EQUAL (NONPOLAR COVALENT BOND) OR UNEQUAL (POLAR COVALENT BOND).

PROCESS OF COVALENT BOND FORMATION:

1. ELECTRON SHARING: ATOMS SHARE ONE OR MORE PAIRS OF ELECTRONS.
2. BOND FORMATION: SHARED ELECTRONS CREATE A STABLE BALANCE OF ATTRACTIVE AND REPULSIVE FORCES.
3. MOLECULE FORMATION: THE SHARED ELECTRONS HOLD THE ATOMS TOGETHER IN A MOLECULE.

CHARACTERISTICS OF COVALENT COMPOUNDS

- LOW MELTING AND BOILING POINTS: DUE TO WEAKER INTERMOLECULAR FORCES.
- STATES OF MATTER: CAN BE GASES, LIQUIDS, OR SOLIDS.
- SOLUBILITY: OFTEN INSOLUBLE IN WATER BUT SOLUBLE IN ORGANIC SOLVENTS.
- ELECTRICAL CONDUCTIVITY: POOR CONDUCTORS OF ELECTRICITY.
- MOLECULAR STRUCTURE: USUALLY FORM DISCRETE MOLECULES.

TYPES OF COVALENT BONDS

- SINGLE BONDS: SHARING ONE PAIR OF ELECTRONS (E.G., H_2).
- DOUBLE BONDS: SHARING TWO PAIRS OF ELECTRONS (E.G., O_2).
- TRIPLE BONDS: SHARING THREE PAIRS OF ELECTRONS (E.G., N_2).

POLARITY IN COVALENT BONDS

- NONPOLAR COVALENT BOND: ELECTRONS ARE SHARED EQUALLY; OCCURS BETWEEN IDENTICAL ATOMS.
- POLAR COVALENT BOND: ELECTRONS ARE SHARED UNEQUALLY; OCCURS BETWEEN DIFFERENT ATOMS WITH DIFFERING ELECTRONEGATIVITIES.

ELECTRONEGATIVITY DIFFERENCE:

ELECTRONEGATIVITY DIFFERENCE	BOND TYPE	EXAMPLE
0	NONPOLAR COVALENT	H_2 , N_2
0.1 - 0.4	SLIGHTLY POLAR COVALENT	CH_4
0.5 - 1.7	POLAR COVALENT	H_2O , NH_3
> 1.7	IONIC (IF VERY HIGH)	$NaCl$, KBr

WORKSHEET EXERCISES FOR COVALENT BONDING

- DRAW LEWIS STRUCTURES: FOR SIMPLE MOLECULES TO VISUALIZE SHARED ELECTRON PAIRS.
- IDENTIFY BOND TYPES: GIVEN MOLECULES, DETERMINE WHETHER BONDS ARE SINGLE, DOUBLE, OR TRIPLE.
- DETERMINE POLARITY: DECIDE IF A MOLECULE IS POLAR OR NONPOLAR BASED ON ELECTRONEGATIVITY.
- MOLECULAR SHAPE ANALYSIS: USE VSEPR THEORY TO PREDICT MOLECULAR GEOMETRIES.

COMPARISON OF IONIC AND COVALENT BONDS

FEATURE	IONIC BOND	COVALENT BOND
FORMATION	TRANSFER OF ELECTRONS	SHARING OF ELECTRONS
ATOMS INVOLVED	METAL + NON-METAL	NON-METAL + NON-METAL
BOND STRENGTH	GENERALLY STRONGER	GENERALLY WEAKER
PHYSICAL STATE	USUALLY SOLID	GASES, LIQUIDS, OR SOLIDS
MELTING POINT	HIGH	USUALLY LOW
CONDUCTIVITY	CONDUCTS WHEN MOLTEN OR DISSOLVED	DOES NOT CONDUCT IN PURE FORM
STRUCTURE	LATTICE OF IONS	DISCRETE MOLECULES

IMPORTANCE OF WORKSHEET ON CHEMICAL BONDING

USING WORKSHEETS ON CHEMICAL BONDING, ESPECIALLY FOCUSING ON IONIC AND COVALENT BONDS, SUPPORTS STUDENTS IN UNDERSTANDING THE MICROSCOPIC WORLD OF ATOMS AND MOLECULES. THESE WORKSHEETS HELP IN:

- REINFORCING THEORETICAL CONCEPTS THROUGH PRACTICE QUESTIONS.
- DEVELOPING VISUALIZATION SKILLS VIA DIAGRAMS.
- ENHANCING UNDERSTANDING OF MOLECULAR STRUCTURES AND PROPERTIES.
- PREPARING STUDENTS FOR LABORATORY WORK AND REAL-WORLD APPLICATIONS.

- BUILDING FOUNDATIONAL KNOWLEDGE FOR ADVANCED CHEMISTRY TOPICS.

CONCLUSION

A COMPREHENSIVE WORKSHEET ON CHEMICAL BONDING, EMPHASIZING IONIC AND COVALENT BONDS, PLAYS A VITAL ROLE IN CHEMISTRY EDUCATION. IT PROVIDES A STRUCTURED APPROACH TO LEARNING HOW ATOMS INTERACT TO FORM THE MYRIAD OF SUBSTANCES AROUND US. BY MASTERING THE CONCEPTS OF IONIC AND COVALENT BONDING, STUDENTS GAIN INSIGHT INTO THE BEHAVIOR OF ELEMENTS AND COMPOUNDS, WHICH IS CRUCIAL FOR UNDERSTANDING CHEMICAL REACTIONS, MATERIAL PROPERTIES, AND VARIOUS SCIENTIFIC PHENOMENA. WHETHER THROUGH IDENTIFYING BOND TYPES, DRAWING LEWIS STRUCTURES, OR UNDERSTANDING MOLECULAR GEOMETRIES, THESE WORKSHEETS ARE INVALUABLE TOOLS IN FOSTERING A DEEPER APPRECIATION AND MASTERY OF CHEMICAL PRINCIPLES.

FREQUENTLY ASKED QUESTIONS

WHAT IS THE MAIN DIFFERENCE BETWEEN IONIC AND COVALENT BONDS?

IONIC BONDS FORM WHEN ELECTRONS ARE TRANSFERRED FROM ONE ATOM TO ANOTHER, RESULTING IN OPPOSITELY CHARGED IONS, WHILE COVALENT BONDS INVOLVE THE SHARING OF ELECTRON PAIRS BETWEEN ATOMS.

HOW DO IONIC COMPOUNDS TYPICALLY BEHAVE IN WATER?

IONIC COMPOUNDS USUALLY DISSOLVE READILY IN WATER, DISSOCIATING INTO THEIR CONSTITUENT IONS AND CONDUCTING ELECTRICITY IN SOLUTION.

WHAT TYPES OF ELEMENTS USUALLY FORM COVALENT BONDS?

NONMETAL ELEMENTS COMMONLY FORM COVALENT BONDS WITH EACH OTHER BECAUSE THEY SHARE ELECTRONS TO ACHIEVE STABLE ELECTRON CONFIGURATIONS.

WHY DO IONIC COMPOUNDS HAVE HIGH MELTING AND BOILING POINTS?

BECAUSE IONIC BONDS ARE STRONG ELECTROSTATIC ATTRACTIONS BETWEEN IONS, A SIGNIFICANT AMOUNT OF ENERGY IS REQUIRED TO BREAK THESE BONDS, RESULTING IN HIGH MELTING AND BOILING POINTS.

WHAT IS A LEWIS STRUCTURE, AND HOW DOES IT HELP IN UNDERSTANDING CHEMICAL BONDING?

A LEWIS STRUCTURE IS A DIAGRAM THAT SHOWS THE VALENCE ELECTRONS OF ATOMS AND HOW THEY ARE SHARED OR TRANSFERRED IN BONDS, HELPING TO VISUALIZE IONIC AND COVALENT BONDING PATTERNS.

CAN MOLECULES HAVE BOTH IONIC AND COVALENT BONDS? PROVIDE AN EXAMPLE.

YES, SOME COMPOUNDS CONTAIN BOTH IONIC AND COVALENT BONDS. FOR EXAMPLE, AMMONIUM CHLORIDE (NH_4Cl) HAS COVALENT BONDS WITHIN THE AMMONIUM ION AND AN IONIC BOND BETWEEN NH_4^+ AND Cl^- .

HOW DOES POLARITY RELATE TO COVALENT BONDS?

POLARITY IN COVALENT BONDS ARISES WHEN ELECTRONS ARE SHARED UNEQUALLY BETWEEN ATOMS WITH DIFFERENT ELECTRONEGATIVITIES, RESULTING IN PARTIALLY POSITIVE AND NEGATIVE REGIONS WITHIN THE MOLECULE.

WHAT IS THE SIGNIFICANCE OF THE OCTET RULE IN CHEMICAL BONDING?

THE OCTET RULE STATES THAT ATOMS TEND TO FORM BONDS TO ACHIEVE A FULL SET OF EIGHT VALENCE ELECTRONS, LEADING TO MORE STABLE IONIC OR COVALENT COMPOUNDS.

HOW CAN YOU DETERMINE WHETHER A MOLECULE IS IONIC OR COVALENT BASED ON ITS CHEMICAL FORMULA?

GENERALLY, COMPOUNDS FORMED BETWEEN A METAL AND A NONMETAL ARE IONIC, WHILE THOSE BETWEEN TWO NONMETALS ARE COVALENT; HOWEVER, OTHER FACTORS LIKE ELECTRONEGATIVITY DIFFERENCES ALSO INFLUENCE THE TYPE OF BONDING.

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worksheet chemical bonding ionic and covalent: Chemistry, 2015-03-16 Chemistry for grades 9 to 12 is designed to aid in the review and practice of chemistry topics. Chemistry covers topics such as metrics and measurements, matter, atomic structure, bonds, compounds, chemical equations, molarity, and acids and bases. The book includes realistic diagrams and engaging activities to support practice in all areas of chemistry. The 100+ Series science books span grades 5 to 12. The activities in each book reinforce essential science skill practice in the areas of life science, physical science, and earth science. The books include engaging, grade-appropriate activities and clear thumbnail answer keys. Each book has 128 pages and 100 pages (or more) of reproducible content to help students review and reinforce essential skills in individual science topics. The series will be aligned to current science standards.

worksheet chemical bonding ionic and covalent: Chemical Misconceptions Keith Taber, 2002 Part 2 provides strategies for dealing with some of the misconceptions that students have, by including ready to use classroom resources.

worksheet chemical bonding ionic and covalent: Chemical Pedagogy Keith S Taber, 2024-12-20 How should chemistry be taught in schools, colleges, and universities? Chemical Pedagogy discusses teaching approaches and techniques, the reasoning behind them, and the evidence for their effectiveness. The book surveys a wide range of different pedagogic strategies and tactics that have been recommended to better engage learners and provide more effective chemistry teaching. These accounts are supported by an initial introduction to some key ideas and debates about pedagogy - the science of teaching. Chemical Pedagogy discusses how teaching innovations can be tested to inform research-based practice. Through this book, the author explores the challenges of carrying out valid experimental studies in education, and the impediments to generalising study results to diverse teaching and learning contexts. As a result, the author highlights both the need to read published studies critically and the value of teachers and lecturers testing out recommended innovations in their own classrooms. Chemical Pedagogy introduces core principles - from research into human cognition and learning - to provide a theoretical perspective on how to best teach for engagement and understanding. An examination of some of the more contentious debates about pedagogy leads to the advice to seek 'optimally guided instruction' which balances the challenge offered to learners with the level of support provided. This provides a framework for discussing a wide range of teaching approaches and techniques that have been recommended to those teaching chemistry across educational levels, including both those intended to replace 'teaching from the front' and others that can be built into traditional lecture courses to enhance the learning experience.

worksheet chemical bonding ionic and covalent: Using Multimodal Representations to Support Learning in the Science Classroom Brian Hand, Mark McDermott, Vaughan Prain,

2015-11-06 This book provides an international perspective of current work aimed at both clarifying the theoretical foundations for the use of multimodal representations as a part of effective science education pedagogy and the pragmatic application of research findings to actual classroom settings. Intended for a wide ranging audience from science education faculty members and researchers to classroom teachers, school administrators, and curriculum developers, the studies reported in this book can inform best practices in K - 12 classrooms of all science disciplines and provide models of how to improve science literacy for all students. Specific descriptions of classroom activities aimed at helping infuses the use of multimodal representations in classrooms are combined with discussion of the impact on student learning. Overarching findings from a synthesis of the various studies are presented to help assert appropriate pedagogical and instructional implications as well as to suggest further avenues of research.

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Question Bank 2026 Chemistry (strictly for 2025-26 boards) Sir Tarun Rupani, 2025-07-12 Fast-track your Chemistry revision with this exam-ready resource This One-shot Question Bank by Sir Tarun Rupani is designed to help ICSE Class 10 students revise the complete Chemistry syllabus quickly and thoroughly. It simplifies theory, boosts numerical accuracy, and ensures strong exam practice-all aligned with the 2025-26 ICSE syllabus. Key Features: Strictly Based on ICSE 2025-26 Curriculum: Complete chapter coverage including Periodic Table, Chemical Bonding, Acid-Base, Organic Chemistry, and more. One-shot Format: Each chapter includes concise concept notes, chemical equations, reactions, and key diagrams for quick recall. Complete Coverage of Question Types: Includes objective, short/long answers, equation-based, numerical, and reasoning questions. Chapterwise PYQs Included: Practice with previous years' ICSE board questions to understand trends and improve retention. Solved Answers in ICSE Format: Clear, well-structured solutions using proper units, chemical symbols, and balanced equations. Smart Revision Focus: Special tips to avoid common mistakes in writing reactions, balancing equations, and attempting numericals. Why Choose This Book? This Chemistry One-shot by Sir Tarun Rupani is built for smart preparation-whether you're revising at the last minute or practising throughout the term. It helps you approach each question with clarity, confidence, and the precision needed to score high in the 2026 ICSE board exam.

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Strikes Back Bruce Robertson, 2021-09-24 Whisper it quietly: a lot of time is being wasted in a lot of schools. Actually, why are we whispering? What we should really be doing is calling this out - loudly! The job of schools is too important for us to keeping quiet. Schools are in the 'transforming lives' business. There is no time to waste! In The Teaching Delusion: Why Teaching In Our Schools Isn't Good Enough (And How We Can Make It Better), Bruce Robertson explored 'delusions' that are holding our schools back. In this sequel, The Teaching Delusion 2: Teaching Strikes Back, he digs deeper into three areas: curriculum, pedagogy and leadership. In doing so, he tackles the issue of time-wasting head-on. By calling out specific delusions in each area, Robertson suggests strategies for dismantling these and offers a clear roadmap forward. Backed by a depth of research and a breadth of experience, The Teaching Delusion 2: Teaching Strikes Back will give teachers and school leaders the supportive shake-up they need, helping them to abandon practices that aren't making the difference they should be, and to focus on the things that will really make the biggest difference to students in our schools.

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others pursuing careers in healthcare. **Anatomy & Physiology Workbook For Dummies** is the fun and easy way to get up to speed on anatomy and physiology facts and concepts. This hands-on workbook provides students with useful exercises to practice identifying specific muscle groups and their functions, memory exercises, as well as diagrams and actual demonstrations that readers can personally enact to illustrate the concepts.

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worksheet chemical bonding ionic and covalent: General Chemistry Workbook Daniel C. Tofan, 2010-07-28 This workbook is a comprehensive collection of solved exercises and problems typical to AP, introductory, and general chemistry courses, as well as blank worksheets containing further practice problems and questions. It contains a total of 197 learning objectives, grouped in 28 lessons, and covering the vast majority of the types of problems that a student will encounter in a typical one-year chemistry course. It also contains a fully solved, 50-question practice test, which gives students a good idea of what they might expect on an actual final exam covering the entire material.

worksheet chemical bonding ionic and covalent: Cambridge IGCSE Chemistry Coursebook with CD-ROM Richard Harwood, Ian Lodge, 2014-07-31 This edition of our successful series to support the Cambridge IGCSE Chemistry syllabus (0620) is fully updated for the revised syllabus from first examination from 2016. Written by a team with teaching and examining experience, Cambridge IGCSE Chemistry Coursebook with CD-ROM gives comprehensive and accessible coverage of the syllabus. Suggestions for practical activities are included, designed to help develop the required experimental skills, with full guidance included on the CD-ROM. Study tips throughout the text, exam-style questions at the end of each chapter and a host of revision and practice material on the CD-ROM are designed to help students prepare for their examinations. Answers to the exam-style questions in the Coursebook are provided on the CD-ROM.

worksheet chemical bonding ionic and covalent: Experiments for Living Chemistry David Ucko, 2012-12-02 Experiments for Living Chemistry provides practical, hands-on experiments illustrating the concepts, substances, and techniques that are important to students in the health-related sciences. Many of these experiments are based on physiological substances to show students how chemical principles apply to the functioning of their own bodies, while other experiments use cut-outs to help students visualize such complex concepts as bonding and protein synthesis. This book is organized into 23 chapters that correspond on a chapter by chapter basis with the Living Chemistry textbook. The first five chapters include discussions on matter, measurement, chemical bonding, compounds, chemical change, gases, and respiration. The subsequent chapters deal with water, solutions, acids, bases, salts, hydrocarbons, and nuclear and organic chemistry. Other chapters explore the oxygen and other derivatives of the hydrocarbons, carbohydrates, lipids, proteins, enzymes, and digestion. Considerable chapters are devoted to the metabolism of carbohydrate, energy, lipid, and proteins. The remaining chapters examine the heredity and protein synthesis, vitamins, hormones, body fluids, drugs, and poisons. At the end of each chapter, there are sets of questions designed to help the student relate the laboratory experiments to the textbook and to the lecture portion of the course. Each experiment in the chapter

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Fast-paced, practical, and innovative, this text for pre-service and in-service teachers features clear, easily accessible lessons and professional development activities to improve the delivery of academic language/literacy education across the content areas in junior/middle school and high school classrooms. Numerous hands-on tools and techniques demonstrate the effectiveness of content-area instruction for students in a wide variety of school settings, particularly English language learners, struggling readers, and other special populations of students. Based on a strong professional development model the authors have been instrumental in designing, *Academic Language/Literacy Strategies for Adolescents* addresses: motivation attributes of academic language vocabulary: theory and practice reading skills development grammar and writing. A wealth of charts, graphs, and lesson plans give clear examples of academic language/literacy strategies in action. The appendices – a key component of the practical applications developed in the text – include a glossary, exemplary lessons that address key content areas, and a Grammar Handbook. In this era of increased accountability, coupled with rapid demographic change and challenges to traditional curricula and pedagogical methods, educators will find this book to be a great resource.

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