

CHE 105 Exam 2 Spring 2016

Your Name: _____ Your ID: _____

Question #: 1

Select **all** of the true statements about differences between covalent and ionic bonds.

- A. Covalent bonds are the result of electrons being shared between atoms while ionic bonds are the result of the transfer of electrons from one atom to another.
 - B. Ionic bonds are the result of electrons being shared between atoms while covalent bonds are the result of the transfer of electrons from one atom to another.
 - C. Covalent bonds typically form between nonmetals while ionic bonds typically form between metals and non-metals.
 - D. Ionic bonds typically form between nonmetals while covalent bonds form between metals and non-metals.
-

Question #: 2

What is the empirical formula for acetic acid, $\text{CH}_3\text{CO}_2\text{H}$? Enter numbers in the formula as plain text (not subscripted). For example, enter H_2O as H2O.

 1

1. _____

Question #: 3

Select **all** of the following chemical names and formulas that represent a **molecular** compound.

- A. mercury
 - B. PCl_3
 - C. K_2O
 - D. CH_2Cl_2
-

Question #: 4

Name each polyatomic ion, using each name once.

[acetate, chlorate, ammonium, perchlorate]

 1 $\text{C}_2\text{H}_3\text{O}_2^-$

 2 ClO_3^-

 3 ClO_4^-

 4 NH_4^+

1. _____

2. _____

3. _____

4. _____

Question #: 5

What is the systematic name of PCl_5 ?

1

1. _____

Question #: 6

What is the mass of 3.52×10^{24} molecules of sucrose ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$, table sugar)?

- A. 2.00 g
 - B. 171 g
 - C. 2.00×10^3 g
 - D. 1.71×10^{-2} g
-

Question #: 7

A 33-gram sample of CCl_2F_2 contains 1 grams of **chlorine**.

Report your answer with **two** significant figures, in the format 2.2E2 or 2.2E-2 if you use scientific notation.

1. _____

Question #: 8

Iron(III) oxide (Fe_2O_3 , hematite) is the main source of iron for the steel industry. The mass of a sample of iron(III) oxide containing 1.21×10^{23} iron atoms is 1 grams.

Report your answer with **two** significant figures, in the format 2.2E2 or 2.2E-2 if you use scientific notation.

1. _____

Question #: 9

A compound is 14.14% carbon, 2.374% hydrogen and 83.49% chlorine by mass.

Its empirical formula is 1.

Enter numbers in the formula as plain text (not subscripted). For example, enter H_2O as H2O.

1. _____

Question #: 10

An organic compound has a molar mass of 184.41 g/mol. If the empirical formula for the compound is CNCl what is its molecular formula?

- A. $\text{C}_{19}\text{N}_{57}\text{Cl}_{22}$
- B. CNCl
- C. $\text{C}_3\text{N}_3\text{Cl}_3$
- D. $\text{C}_2\text{N}_2\text{Cl}_2$

Question #: 11

Fill in the blanks with the smallest whole-number coefficients to balance the chemical equation below. If a coefficient is 1, fill in 1.



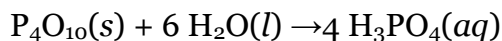
1. _____

2. _____

3. _____

Question #: 12

P_4O_{10} reacts with water to form phosphoric acid according to the following balanced equation:

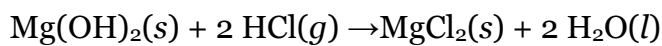


How much P_4O_{10} is needed to produce 36.0 grams of phosphoric acid? Assume that there is excess water and the yield is 100%.

- A. 71.0 g
 - B. 417 g
 - C. 26.1 g
 - D. 284 g
-

Question #: 13

A maximum of 1 grams of MgCl_2 can be produced from the reaction of 25 grams of $\text{Mg}(\text{OH})_2$ with 25 grams of HCl .

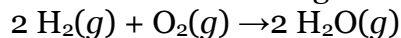


Report your answer with **two** significant digits, in the form 2.2E2 or 2.2E-2 if you use scientific notation.

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Question #: 14

Consider the following chemical reaction:



A reaction of 5.0 grams of hydrogen (2.02 g/mol) with excess oxygen (32.00 g/mol) produces 38 grams of water (18.02 g/mol).

The yield of water is 1 %.

Report your answer with **two** significant figures. Do **not** use scientific notation.

1. _____

Question #: 15

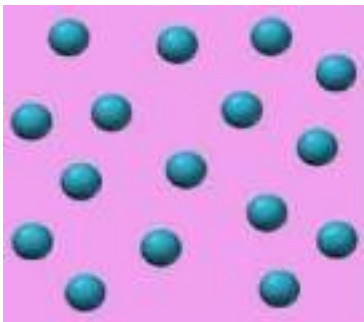
What mass of CaBr_2 is found in 35.0 mL of a 0.450 M solution? Molar mass of $\text{CaBr}_2 = 199.89$ g/mol.

- A. 12.7 g
- B. 2.57 g
- C. 7.88 g
- D. 3.15 g

Question #: 16

Which figure shows the **most concentrated** solution? The pink background represents solvent and the blue circles represent solute molecules.

A.



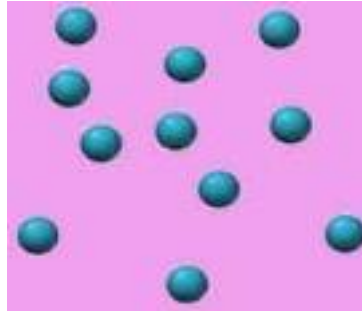
C.



B.



D.



Question #: 17

Which of the following compounds is a **strong** electrolyte that is **very soluble** in water?

- A. CH_2Cl_2
- B. $\text{NH}_4\text{C}_2\text{H}_3\text{O}_2$
- C. Hg_2I_2
- D. BaCO_3

Question #: 18

What is the solid product when aqueous solutions of $\text{Pb}(\text{NO}_3)_2$ and LiCl are combined?

- A. LiNO_3
- B. $\text{Li}(\text{NO}_3)_2$
- C. PbCl
- D. PbCl_2

Question #: 19

What is the **net ionic** equation for the reaction that occurs when aqueous solutions of $\text{Pb}(\text{NO}_3)_2$ and Na_2S are mixed?

- A. $\text{Pb}^{2+}(\text{aq}) + \text{S}^{2-}(\text{aq}) \rightarrow \text{PbS}(\text{s})$
 - B. $\text{Pb}^{2+}(\text{aq}) + \text{NO}_3^{2-}(\text{aq}) \rightarrow \text{PbNO}_3(\text{s})$
 - C. $\text{Pb}^{2+}(\text{aq}) + \text{S}^{2-}(\text{aq}) + 2 \text{NO}_3^{-}(\text{aq}) + 2 \text{Na}^{+}(\text{aq}) \rightarrow \text{PbS}(\text{s}) + 2 \text{NaNO}_3(\text{s})$
 - D. $\text{Na}^{+}(\text{aq}) + \text{NO}_3^{-}(\text{aq}) \rightarrow \text{NaNO}_3(\text{aq})$
-

Question #: 20

A 25 mL sample of an aqueous $\text{Ba}(\text{OH})_2$ solution requires 35 mL of a 0.18 M hydrochloric acid (HCl) solution to reach the equivalence point. The concentration of the $\text{Ba}(\text{OH})_2$ solution is 1 M.

Report your answer with **two** significant digits, in the form 2.2E2 or 2.2E-2 if you use scientific notation.

1. _____

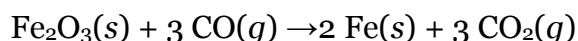
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The oxidation number of chromium in $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ is 1 .

1. _____

Question #: 22

In the given reaction, Fe_2O_3 is the 1 agent and CO is the 2 agent.



Fill in each blank with one of these words: **precipitating**, **reducing**, **oxidizing**, **dehydrating**

1. _____

2. _____

Question #: 23

A cylinder used for scuba diving has a working pressure of 175 atm. What is this pressure in torr?

- A. 1.33×10^5 torr
- B. 2.30×10^{-1} torr
- C. 1.77×10^7 torr
- D. 1.77×10^4 torr

Question #: 24

A sample of $N_2(g)$ occupies 32 L at 81 °C.

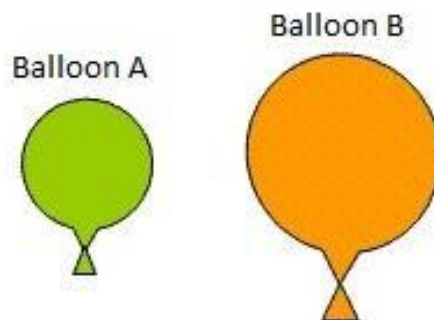
The volume of the nitrogen gas is 26 L at 1 °C at the same pressure.

Report your answer with **two** significant digits, in the form 2.2E2 or 2.2E-2 if you use scientific notation.

1. _____

Question #: 25

Select the **true** statement about these two balloons filled with helium at the same pressure and temperature.

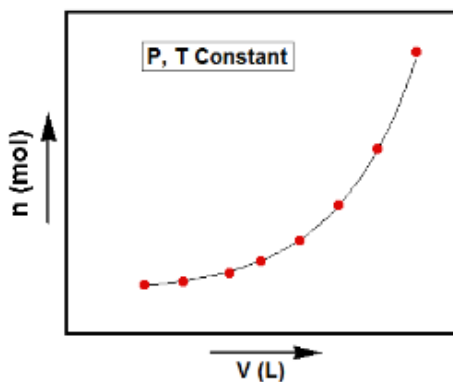


- A. **A** and **B** contain equal moles of helium.
- B. **B** contains more moles of helium than **A**.
- C. **A** contains more moles of helium than **B**.
- D. Moles of helium in the balloons cannot be compared unless values of both temperature and pressure are known.

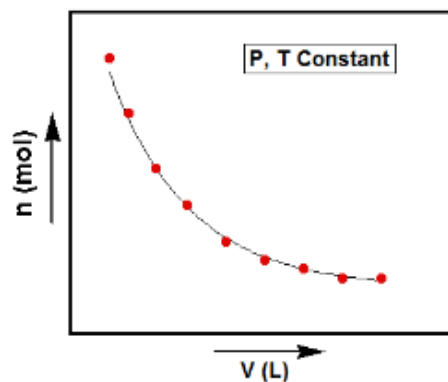
Question #: 26

Select **all** of the following plots that show the behavior of an ideal gas when two properties are varied while the others are held constant.

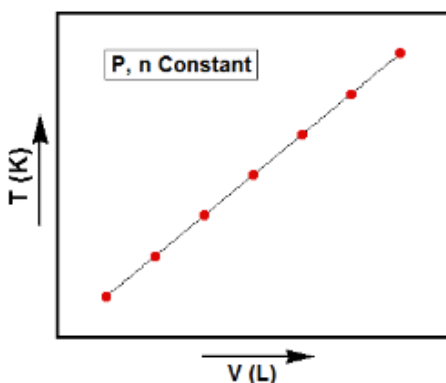
A.



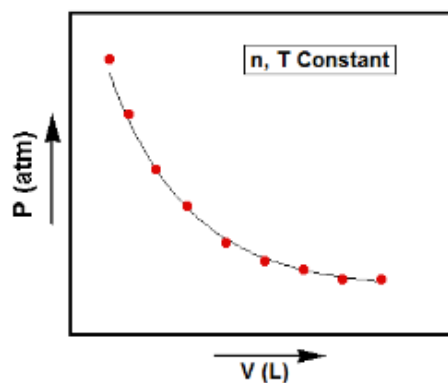
C.



B.



D.



Question #: 27

A 28.8-gram piece of dry ice (solid carbon dioxide) sublimates into a gas, which fills a previously empty balloon. Assuming ideal gas behavior, what is the volume of the balloon at 742 mmHg and 22.0 °C?

- A. 16.2 L
- B. 25.5 L
- C. 20.7 L
- D. 2.50 L

Question #: 28

A 4.00-centimeter cube at 7.20 °C temperature and 2.00 atm pressure was filled with 0.240 g of a gas. Calculate the molar mass of the gas in the units of g/mol.

- A. 1.11
- B. 43.1
- C. 690
- D. 173

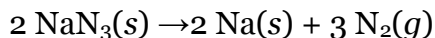
Question #: 29

A 1.00 L container has a total pressure of 0.879 atm and contains 0.0150 M CH₄, 0.00750 M N₂, and 0.00850 M Ar. What is the partial pressure of Ar?

- A. 0.850 atm
- B. 0.241 atm
- C. 0.332 atm
- D. 0.274 atm
- E. 0.879 atm

Question #: 30

Sodium azide decomposes to sodium metal and nitrogen gas.



If an automobile air bag has a volume of 11.8 L, what mass of NaN₃ is required to fully inflate the air bag with nitrogen gas during a collision? Assume STP conditions.

- A. 22.8 grams
- B. 35.7 grams
- C. 5.81 grams
- D. 17.6 grams

CHE 105 Exam 2 Spring 2016

Question #: 1

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 1

1_

CH2O|COH2|H2OC|H2CO|OCH2|OH2C|C1H2O1|C1O1H2|H2O1C1|H2C1O1|O1C1H2|O
1H2C1|

Question #: 3

Select **all** of the following chemical names and formulas that represent a **molecular** compound.

- A. mercury
- B. PCl_3
- C. K_2O
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Name each polyatomic ion, using each name once.

[acetate, chlorate, ammonium, perchlorate]

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 2 ClO_3^-
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 4 NH_4^+

1. acetate
2. chlorate
3. perchlorate
4. ammonium

Question #: 5

What is the systematic name of PCl_5 ?

1

1. phosphorus pentachloride|phosphorus pentachloride|phosphorous pentachloride|phosphorus pentchloride|

Question #: 6

What is the mass of 3.52×10^{24} molecules of sucrose ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$, table sugar)?

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Question #: 7

A 33-gram sample of CCl_2F_2 contains 1 grams of **chlorine**.

Report your answer with **two** significant figures, in the format 2.2E2 or 2.2E-2 if you use scientific notation.

1. 19|19.|1.9E1|19g|19.g|1.9E1g|19 g|19. g|1.9E1 g|

Question #: 8

Iron(III) oxide (Fe_2O_3 , hematite) is the main source of iron for the steel industry. The mass of a sample of iron(III) oxide containing 1.21×10^{23} iron atoms is 1 grams.

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A compound is 14.14% carbon, 2.374% hydrogen and 83.49% chlorine by mass.

Its empirical formula is 1.

Enter numbers in the formula as plain text (not subscripted). For example, enter H_2O as H2O.

1. CH2Cl2|CCl2H2|H2Cl2C|Cl2H2C|H2CCl2|Cl2CH2|

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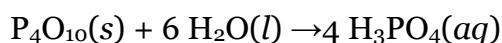
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- 1. 3
- 2. 4
- 3. 1

Question #: 12

P₄O₁₀ reacts with water to form phosphoric acid according to the following balanced equation:

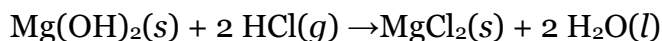


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A maximum of 1 grams of MgCl₂ can be produced from the reaction of 25 grams of Mg(OH)₂ with 25 grams of HCl.

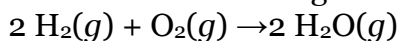


Report your answer with **two** significant digits, in the form 2.2E2 or 2.2E-2 if you use scientific notation.

1. 32.6|33|32|32.6g|33g|32g|32.6 g|33 g|32 g|

Question #: 14

Consider the following chemical reaction:



A reaction of 5.0 grams of hydrogen (2.02 g/mol) with excess oxygen (32.00 g/mol) produces 38 grams of water (18.02 g/mol).

The yield of water is 1 %.

Report your answer with **two** significant figures. Do **not** use scientific notation.

1. 85|86|84|85.|86.|84.|85%|86%|84%|85.%|86.%|84.%|85 %|86 %|84 %|85. %|86. %|84. %|

Question #: 15

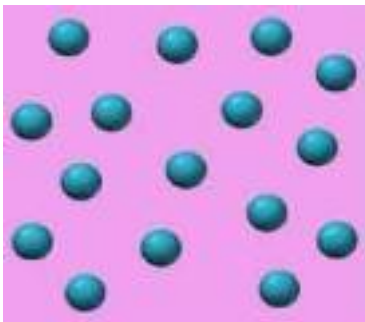
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Which figure shows the **most concentrated** solution? The pink background represents solvent and the blue circles represent solute molecules.

✓ A.



C.



B.



D.



Question #: 17

Which of the following compounds is a **strong** electrolyte that is **very soluble** in water?

- A. CH_2Cl_2
- ✓ B. $\text{NH}_4\text{C}_2\text{H}_3\text{O}_2$
- C. Hg_2I_2
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What is the **net ionic** equation for the reaction that occurs when aqueous solutions of $\text{Pb}(\text{NO}_3)_2$ and Na_2S are mixed?

- ✓ A. $\text{Pb}^{2+}(\text{aq}) + \text{S}^{2-}(\text{aq}) \rightarrow \text{PbS}(\text{s})$
 - B. $\text{Pb}^{2+}(\text{aq}) + \text{NO}_3^{2-}(\text{aq}) \rightarrow \text{PbNO}_3(\text{s})$
 - C. $\text{Pb}^{2+}(\text{aq}) + \text{S}^{2-}(\text{aq}) + 2 \text{NO}_3^{-}(\text{aq}) + 2 \text{Na}^{+}(\text{aq}) \rightarrow \text{PbS}(\text{s}) + 2 \text{NaNO}_3(\text{s})$
 - D. $\text{Na}^{+}(\text{aq}) + \text{NO}_3^{-}(\text{aq}) \rightarrow \text{NaNO}_3(\text{aq})$
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Question #: 20

A 25 mL sample of an aqueous $\text{Ba}(\text{OH})_2$ solution requires 35 mL of a 0.18 M hydrochloric acid (HCl) solution to reach the equivalence point. The concentration of the $\text{Ba}(\text{OH})_2$ solution is 1 M.

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1. 0.13|.13|0.126|.126|

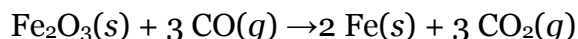
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The oxidation number of chromium in $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ is 1 .

1. 6|+6|six|6+|

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In the given reaction, Fe_2O_3 is the 1 agent and CO is the 2 agent.



Fill in each blank with one of these words: **precipitating**, **reducing**, **oxidizing**, **dehydrating**

- 1. oxidizing|oxdizing|oxidant|oxidize|
 - 2. reducing|reducting|reductant|reduce|
-

Question #: 23

A cylinder used for scuba diving has a working pressure of 175 atm. What is this pressure in torr?

- ✓ A. 1.33×10^5 torr
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A sample of $N_2(g)$ occupies 32 L at 81 °C.

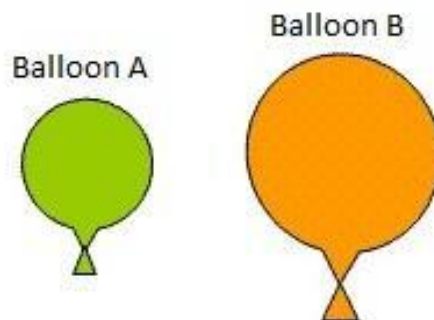
The volume of the nitrogen gas is 26 L at 1 °C at the same pressure.

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1. 15|14.6|14|

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Select the **true** statement about these two balloons filled with helium at the same pressure and temperature.

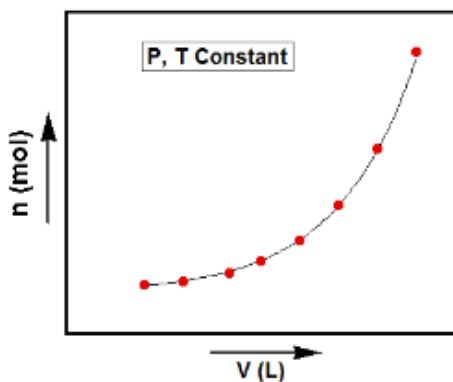


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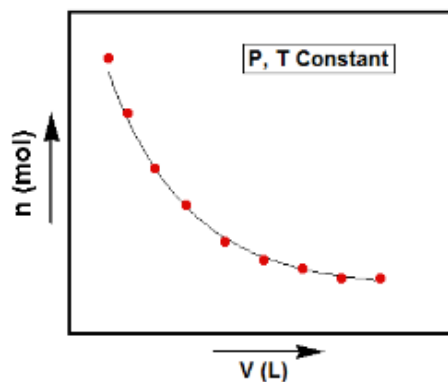
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Select **all** of the following plots that show the behavior of an ideal gas when two properties are varied while the others are held constant.

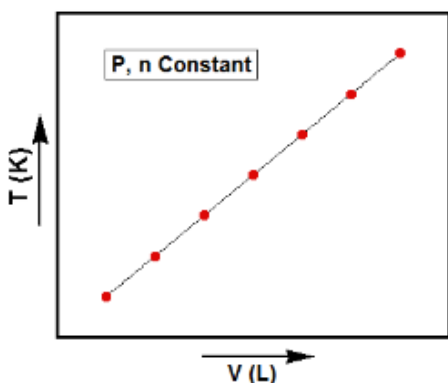
A.



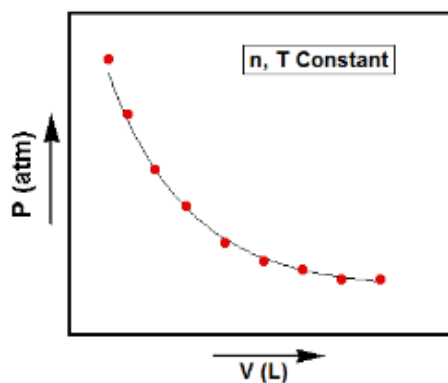
C.



✓ B.



✓ D.



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A 28.8-gram piece of dry ice (solid carbon dioxide) sublimates into a gas, which fills a previously empty balloon. Assuming ideal gas behavior, what is the volume of the balloon at 742 mmHg and 22.0 °C?

- ✓ A. 16.2 L
- B. 25.5 L
- C. 20.7 L
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A 4.00-centimeter cube at 7.20 °C temperature and 2.00 atm pressure was filled with 0.240 g of a gas. Calculate the molar mass of the gas in the units of g/mol.

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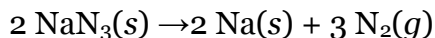
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