



CHEMISTRY

BOOKS - JMD CHEMISTRY (PUNJABI ENGLISH)

ELECTRO CHEMISTRY

Example

1. The unit of specific conductance is: ohm , $ohm^{-1}cm^{-1}$

$ohm^{-1}cm$ ohm^2

A. ohm

B. $ohm^{-1}cm^{-1}$

C. ohm^{-1}cm

D. ohm^2

Answer: B



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2. The standard EMF of Daniel cell is 1.10V. The maximum electrical work obtained from the cell is [$if n = 2$]:

A. 175.4kj

B. 212.3kj

C. 106.15kj

D. 53.07kj

Answer: B



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3. The conductivity of metals increases with:

- A. Increase in temperature
- B. decrease in temperature
- C. No change observed
- D. Increase then decrease

Answer: B



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4. The electrode potential of SHE is fixed as

A. $0.34V$

B. $-0.44V$

C. Zero

D. $-0.76V$

Answer: C



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5. Unit of equivalent conductance is:

A. $ohm^{-1}cm^{-1}$

B. $\text{ohm}^{-1}\text{cm}^{-1}$

C. $\text{ohm}^{-1}\text{cm}^2$

D. $\text{ohm}^{-1}\text{cm}^2(\text{g.eq.})^{-1}$

Answer: D



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6. In a galvanic cell,

A. Potential energy decreases

B. Kinetic energy decreases

C. potential energy changes into electrical energy

D. Chemical energy changes into electrical energy

Answer: D



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7. For a redox reaction to proceed in a cell, the e.m.f. must be:

- A. Positive
- B. Negative
- C. Fixed
- D. Zero

Answer: A



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8. The amount of silver (at. mass=108) deposited from a solution of silver nitrate, when a current of 9650 coulombs was passed is:

A. 10.8gm

B. 0.108gm

C. 1.08gm

D. 1.08×10^3

Answer: A



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9. Numbers of coulombs required to deposit 90 gm of aluminium, when the electrode fraction is,

$Al^3 + 3e^- \rightarrow Al$ 9.65×10^4 , 8.68×10^5 , 9.65×10^5 ,
6.95.

A. 9.65×10^4

B. 8.68×10^5

C. 9.65×10^5

D. 6.95

Answer: C



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10. The units of cell constant are: $\text{ohm}^{-1}\text{cm}^{-1}$, cm , ohm^{-1}cm , cm^{-1}

A. $\text{ohm}^{-1}\text{cm}^{-1}$

B. cm

C. ohm^{-1}cm

D. cm^{-1}

Answer: D



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11. The units of conductivity are

A. ohm^{-1}

B. $\text{ohm}^{-1}\text{cm}^{-1}$

C. $\text{ohm}^{-2}\text{cm}^{-2} \equiv^{-1}$

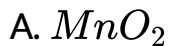
D. $\text{ohm}^{-1}\text{cm}^2$

Answer: B



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12. In a dry cell the depolarizer is :



C. Charcoal powder

D. NH_4Cl

Answer: A



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13. For one mole of electrolyte which of the following increases with dilution?

- A. Resistance
- B. Specific conductance
- C. Molar conductance
- D. None of these

Answer: C



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14. For a redox reaction to proceed in a cell, the e.m.f. must be:

- A. Positive
- B. Negative
- C. Fixed
- D. Zero

Answer: A



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15. Galvanised iron sheets are coated with: *C, Cu, Zn, Ni*

A. *C*

B. *Cu*

C. *Zn*

D. *Ni*

Answer: A



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16. Name the metal used in galvanisation of iron?

A. Zinc

B. Magnesium

C. Copper

D. Aluminum

Answer: A



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17. Copper sulphate solution cannot be stored in a vessel made up of: Zinc, Glass, Copper, Plastic.

A. Zinc

B. Glass

C. Copper

D. Plastic

Answer: A

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18. Which of the following statements is false?

A. Oxidation and reduction half- reactions occur at electrodes in electrochemical cells

B. All voltaic (galvanic) cells involve the use of electricity to initiate non-spontaneous chemical reactions

C. Reduction occur at the cathode

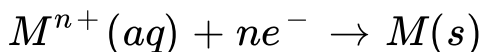
D. Oxidation occurs at the anode.

Answer: B



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19. for the electrrode reaction,



Nernst equation is: $E = E^{\circ} + \frac{RT}{nF} \ln \frac{1}{[M^{n+}]}$,

$$E = E^{\circ} + RT \ln [M^{n+}], \quad E = E^{\circ} + \frac{RT}{nF} \ln [M^{n+}],$$

$$\frac{E}{E^{\circ}} = \frac{RT}{nF} \ln [M^{n+}] \dots$$

A. $E = E^{\circ} + \frac{RT}{nF} \log \frac{1}{[M^{n+}]}$

B. $E = E^{\circ} + RT \ln [M^{n+}]$

$$C. E = E^o + \frac{RT}{nF} \ln [M^{n+}]$$

$$D. \frac{E}{E^o} = \frac{RT}{nF} \ln [M^{n+}].$$

Answer: C



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20. The tendencies of the electrodes made up of Cu, Zn and Ag to release electrons, when dipped in their respective salt solutions decreases in the order:

$Zn > Ag > Cu$, $Cu > Zn > Ag$, $Zn > Cu > Ag$,

$Ag > Cu > Zn$.

A. $Zn > Ag > Cu$

B. $Cu > Zn > Ag$

C. $Zn > Cu > Ag$

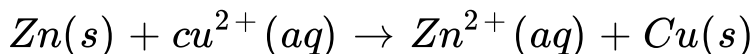
D. $Ag > Cu > Zn$

Answer: C



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21. Consider the following reactions:



With reference to the above reaction which one of the following is correct statement:

A. Zn is reduce to Zn^{2+}

B. Zn is oxidised to Zn^{2+} ions

C. Zn^{2+} ions are oxidised to Zn

D. Cu^{2+} ions are oxidised to cu

Answer: B



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22. In a galvanic cell, which one of the following statements is not correct?

- A. Anode is negatively charged
- B. Cathode is positively charged
- C. Reduction takes place at anode
- D. Reduction takes place at cathode.

Answer: C



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23. E_{cell} and ΔG^o are related as: $\Delta G^o = nFE^o$,

$$\Delta G^o = -nFE^o,$$

$$\Delta G^o = -nFE_{cell}^o,$$

$$\Delta G^o = nFE_{cell}^o = 0.$$

A. $\Delta G^o = nFE^o$

B. $\Delta G^o = -nFE^o$

C. $\Delta G^o = -nFE_{cell}^o$

D. $\Delta G^o = nFE_{cell}^o = 0$

Answer: C



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24. The S.I. units of molar conductivity are: Sm^2mol^{-2} ,
 $Smmol^{-1}$, Sm^2mol^{-1} , Sm^3mol^{-1}

A. Sm^2mol^{-2}

B. $Smmol^{-1}$

C. Sm^2mol

D. Sm^3mol^{-1}

Answer: A



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25. The electrode potential of SHE is fixed as

A. $0.34V$

B. $-0.44V$

C. $0V$

D. $-0.76V$

Answer: C



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26. In galvanisation, metal plating on iron to protect against corrosion is:

A. Nickel plating

B. Copper plating

C. Tin plating

D. Zinc plating

Answer: D



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27. Which of the following statements is regarding rusting/corrosion?

A. Iron rust faster in saline water than in pure water

B. Less active metals are readily corroded

C. Air and moisture decreases corrosion

D. Corrosion occurs slowly at bends, scratches or cuts
in metals

Answer: A

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28. Rust is mixture of:

- A. FeO and $Fe(OH)_3$
- B. FeO and $Fe(OH)_2$
- C. Fe_2O_3 and $Fe(OH)_3$
- D. Fe_2O_4 and $Fe(OH)_3$

Answer: C



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29. In a galvanic cell cathode is positive electrode and anode is negative electrode.



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30. Why does the conductivity of a solution decrease with dilution?



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31. What is dilution?



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32. Describe $Ni - Cd$ storage cell.

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33. Define Specific conductance.

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34. During electrolysis of $NaCl(aq)$ using inert electrodes, the product at anode is oxygen

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35. Kohlrausch law can be used to find the molar conductivity of a weak electrolyte at infinite dilution.

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36. Electrical conductance of metals decreases with increase in temperature.

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37. Larger the size of an ion, more is its ionic conductance

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38. What are electrochemical cells? Name the two types of electrochemical cells.

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39. Write four differences between galvanic (or electrochemical) cell and electrolytic cell.

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40. What do you understand by standard reduction potential of electrode?

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41. What do you understand by normal hydrogen reduction potential of electrode? give its structure and working.



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42. What is salt bridge? give its functions.



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43. Can a Galvanic cell work without a salt bridge?



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44. Why does the e.m.f. of a galvanic cell decrease on drawing current from it? When does it fall to zero

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45. Distinguish between emf and potential difference.

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46. What do you understand by electrode potential?

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47. Name the factors on which electrode potential depends?

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48. Why is it not possible to measure the single electrode potential?

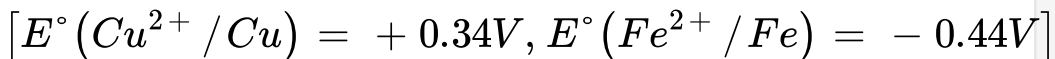
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49. Explain the construction and working of a Galvanic cell.

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50. Can we store copper sulphate solution in iron vessel?

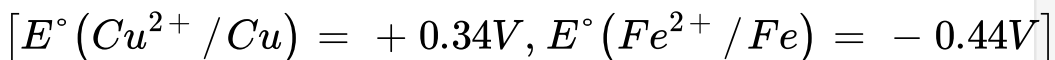
Give suitable explanation in support of your answer



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51. Can we store copper sulphate solution in iron vessel?

Give suitable explanation in support of your answer



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52. Can we store copper sulphate solution in iron vessel?

Give suitable explanation in support of your answer

$$[E^\circ(Cu^{2+} / Cu) = + 0.34V, E^\circ(Fe^{2+} / Fe) = - 0.44V]$$



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53. What is electrochemical series? How it used to determine the e.m.f. of the cell?



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54. State and explain Nernst equation.



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55. Derive equilibrium constant from Nernst equation.

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56. How is standard Gibbs energy of a reaction related to its equilibrium constant?

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57. Define conductivity and molar conductivity for the solution of an electrolyte. Discuss their variation with concentration.

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58. Write four differences between metallic conductors and electrolytic conductor.

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59. State and explain Kohlrausch's law. How would you determine the molar conductance of a weak electrolyte at infinite dilution?

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60. What is cell constant? Give its units..

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61. How is molar conductivity related to conductivity of a solution? Derive the units of molar conductivity.

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62. What is electrolysis? State and explain Faraday's two laws of electrolysis.

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63. Write short note on dry cell.

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64. Give the cathode, anode, electrolyte and electrode reactions of mercury cell.



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65. What are primary and secondary cell? How do they differ from each other?



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66. Write short note on lead storage battery.



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67. Describe $Ni - Cd$ storage cell.

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68. What are fuel cells? Discuss $H_2 - O_2$ fuel cell. List some advantages of fuel cells over other cells.

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69. What is corrosion?

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70. Discuss the electrochemical theory of corrosion.

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71. What is galvanisation?

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72. Give two methods to protect iron from rusting.

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73. Discuss the factors responsible for rusting of iron.



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74. The conductivity of $0.20M KCl$ solution at 298 K is 0.0248 S cm^{-1} . Calculate its molar conductivity.

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75. The resistance of $0.25M$ solution of an electrolyte was found to be 75Ω . Calculate molar conductivity of the solution, if the electrodes in the cell are 1.8 cm apart and have an area of cross section 3.6 cm^2 .

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76. Calculate the molar conductance of a solution of $MgCl_2$ at infinite dilution, given that the molar ionic conductance of $\lambda^\circ(Mg^{2+}) = 126.1 S cm^2 mol^{-1}$ and $\lambda^\circ(Cl^-) = 56.3 S cm^2 mol^{-1}$.

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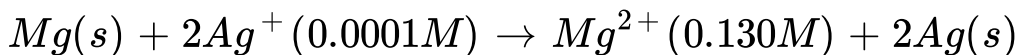
77. Calculate the molar conductance at infinite dilution ($\lambda^\circ m$) of $CaCl_2$, given that molar ionic conductance for $\lambda^\circ m(Ca^{2+}) 119.5$ and $Cl^- (76.3) S cm^2 mol^{-1}$

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78. The molar conductivities at infinite dilution for sodium acetate, hydrochloric acid and sodium chloride are 92.5, 426.9 and 120.4 $S\text{cm}^2\text{mol}^{-1}$ respectively at 298 K. Calculate the molar conductivity of acetic acid at infinite dilution.

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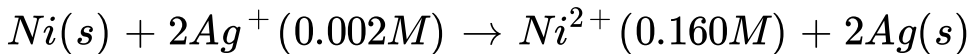
79. Represent the cell in which the following reaction takes place



Calculate its E_{cell} if $E_{\text{cell}} = 3.17$ V.

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80. calculate the e.m.f of the cell in which the following reaction takes place:

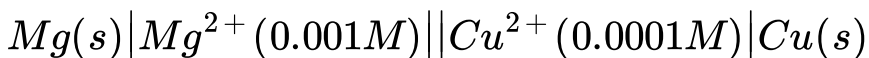


Given that $E_{cell}^o = 1.05V$



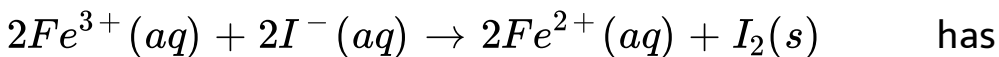
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81. Write Nernst equation and calculate e.m.f. of the cell at 298 k.



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82. The cell in which the following reaction occurs:

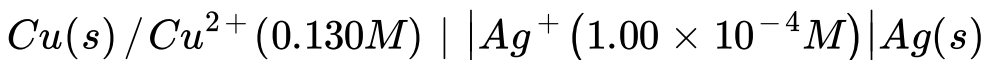


$E_{cell}^{\circ} = 0.236V$ at 298 K. Calculate the standard Gibbs energy and the equilibrium constant of the cell reaction.



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83. the E_{cell} and ΔG for the galvanic cell



given that $E^{\circ}(Cu^{2+} / Cu) = 0.34V$ and

$$E^{\circ}(Ag^{+} / Ag) = 0.80V$$



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84. Calculate the cell e.m.f. and ΔG for the cell at 298 k.



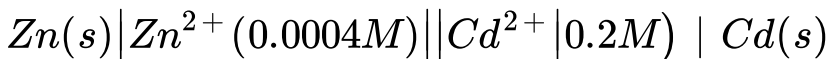
Given $E^\circ (Al^{3+} / Al) = -1.66V$ and

$$E^\circ (Fe^{2+} / Fe) = -0.44V.$$



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85. Calculate the cell e.m.f. ΔG for the cell reaction at 25°C.



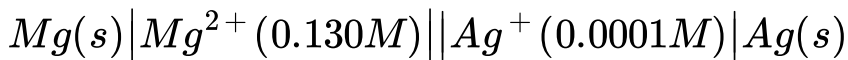
E° values at 25°C, $Zn^{2+} / Zn = -0.763V$ and

$$Cd^{2+} / Cd = -0.403V$$



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86. Write Nernst equation and calculate e.m.f. of the following cell at 298 k.



Given $E^{\circ}(Mg^{2+} / Mg) = - 2.37V$

$$E^{\circ}(Ag^{+} // Ag) = 0.80 V (\log 1.3 = 0.1130)$$

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87. How much electricity in terms of faraday is required to produce?

20.0 g of Ca from molten $CaCl_2$

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88. How much electricity in terms of faraday is required to produce?

40.0 g of Al from molten Al_2O_3

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89. A solution of $Ni(NO_3)_2$ is electrolyzed between platinum electrodes using a current of 5.0 amperes for 20 minutes. What weight of Ni will be produced at cathode ? The atomic mass of Ni = 58.7 a. m. u ?

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90. What mass of zinc can be produced by the electrolysis of zinc sulphate solution when a current of 1.5 amperes is passed for 15 minutes ? Atomic mass of zinc = 65.4 *a. m. u.*

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91. A solution of copper sulphate is electrolysed for 10 minutes with a current of 1.5 amperes. What is the mass of copper deposited at cathode ? The atomic mass of copper = 63.5 *a. m. u.*

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