A significantly hypokalemic and dehydrated 500-kg horse needs a high level of potassium chloride (KCl) supplementation.

K^+ typically should not be administered at a rate over 0.5 mEq/kg/hr. The KCl is 2 mEq/mL. Lactated ringers solution (LRS) contains 4 mEq K^+/L.

What is the approximate maximum amount of potassium chloride (KCl) that could be added to 10 L of LRS in order to run the fluids at 4 L/h?

Need more information	HIDE
About 500 mLs	HIDE
About 10 mLs	HIDE
About 300 mLs	HIDE
About 70 mLs	HIDE

Correct:

About 300 mLs of KCl can be added to 10 L of LRS if the maximum safe dose is 0.5 mEq/kg/hr.

This is a very important calculation because potassium supplementation can be fatal if done too quickly. Hyperkalemia raises the resting membrane potential of cells, causing a hyper-excitable state. This can result in muscle and nerve excitability, which can cause cardiac arrhythmias or ARREST.

Here's the calculation:

500 kg horse x 0.5 mEq/kg/hr = 250 mEq/hr of KCl is maximum safe dose

250 mEq/hr divided by 2 mEq/mL = 125 mLs/hr of KCl

At a rate of 4 L/hr, each 4L can contain 125 mLs of KCl

10L will take 2.5 hours to administer at a rate of 4 L/hr

So, 125 mLs x 2.5 = 312.5 mLs of 2 mEq/mL KCl can be in 10 L

The 10 L LRS contains 4 mEq/L = 40 mEq total. This is negligible in the calculation for a horse but is included below to show it.

Working backwards to check your work:

10 L = 10,000 mLs

Add 300 mLs of KCl So total volume to infuse is 10300 mLs

The concentration of this solution is 640 mEq KCl ((= 300 mLs of KCl x 2 mEq/mL) +

Add 300 mLs of KCl So total volume to infuse is 10300 mLs

The concentration of this solution is 640 mEq KCl ((= 300 mLs of KCl x 2 mEq/mL) + 40 mEq in the LRS)/10300 mLs = 0.06 mEq/mL

(note: try it - if you don't include the K^+ in the LRS, you still get 0.06 mEq/mL)

0.06 mEq/mL x 4000 mLs/hr = 242 mEq/hr...compare to first calculation: 500 kg horse x 0.5 mEq/kg/hr = 250 mEq/hr of KCl is maximum safe dose - so pretty close!

Refs: The Merck Vet Manual online and McCurnin's Clinical Texbook for Veterinary Technicians, 8th ed.

zukureview

SAVE & EXIT

PREV NEXT

11	12	13	14	15	16	17	18	19	20

You are comparing two sets of lab results from a dog. The sodium level is in mEq/L on one and in mmol/L on the other.

What is the conversion factor to change mEq/L of sodium to mmol/L of sodium?

4	HIDE
0.25	HIDE
1	HIDE
0.5	HIDE
2	HIDE

BACK NEXT LEAVE BLANK

Correct:

The conversion factor for sodium from mEq to mmol is 1. An equivalent is a unit that integrates charge and moles.

One equivalent signifies one mole of charges and can be calculated by multiplying the number of moles of charged particles in the substance by its valence (or amount of charge).

Thus, for ions with a +1 or −1 charge (e.g., Na^+, K^+, Cl^-), 1 mol = 1 equivalent (Eq) so 1 mmol = 1 mEq.

Refs: The Merck Veterinary Manual online and the Merck Professional Manual online.

Ready Reference Guides

By **Manuals Staff**

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Patient Education

In the US, most laboratory test results are reported in what are termed conventional units; the rest of the world reports results in *Système International d'Unités* (SI) or international units (IU). The unit basis for SI is updated periodically by a panel.

Many SI units are the same as units used in the US system; however, SI units for concentrations are not. SI concentrations are reported as moles (mol) or decimal fractions of a mole (eg, millimole, micromole) per unit volume in liters (L). Conventional units are reported as mass (eg, grams, milligrams) or chemical equivalency (eg, milliequivalents) per unit volume, which may be in liters or decimal fractions of liters (eg, deciliters, milliliters). Results reported in amount per 100 mL (1 dL) are sometimes expressed as percent (eg, 10 mg/dL may be written as 10 mg%).

Moles, milligrams, and milliequivalents: A mole is an Avogadro's number (6.023×10^{23}) of elementary entities (eg, atoms, ions, molecules); the mass of 1 mole of a substance is its atomic weight in grams (eg, 1 mole of sodium = 23 g, 1 mole of calcium = 40 g). Similarly, the mass of a given quantity of substance divided by its atomic weight gives the number of moles (eg, 20 g sodium = 20/23, or 0.87, mol).

An equivalent is a unit that integrates charge and moles; 1 equivalent represents one mole of charges and is calculated by multiplying the number of moles of charged particles in a substance times the valence of that substance. Thus, for ions with a +1 or −1 charge (eg, Na^+, K^+, Cl^-), 1 mole is 1 equivalent ($1 \times 1 = 1$); for ions with a +2 or −2 charge (eg, Ca^{2+}), ½ mole is 1 equivalent ($½ \times 2 = 1$), and so forth for other valence values. A milliequivalent (mEq) is 1/1000 of an equivalent.

The following can be used to convert between mEq, mg, and mmol:

mEq = mg/formula wt × valence = mmol × valence

mg = mEq × formula wt /valence = mmol × formula wt

mmol = mg/formula wt = mEq/valence

(Note: Formula wt = atomic or molecular wt.)

Alternatively, conversion tables are available in print and on the Internet.

Clinical Calculator:
Weight Unit Conversions

Clinical Calculator:
Volume Unit Conversions

Clinical Calculator:
Temperature Unit Conversions

Clinical Calculator:
Flow Unit Conversions

Clinical Calculator:
Energy Unit Conversions

Clinical Calculator:
Basic Unit Conversions

Clinical Calculator:
Length Unit Conversions

Metric System	
Unit	**Equivalent Subunit**
Mass	

1 kilogram (kg)	1000 grams (10^3 g)

Metric–Nonmetric Equivalents

Metric Unit	Equivalent Nonmetric Unit*
Liquid	
30 milliliters (mL)	1 fluid ounce (oz)

Atomic Weight of Some Elements Important in Medicine

Element	Symbol	Atomic Weight*
Hydrogen	H	1
Carbon	C	12
Nitrogen	N	14

Centigrade–Fahrenheit Equivalents*

Application	°C	°F
Freezing for water at sea level	0	32
Clinical range	36.0	96.8
	36.5	97.7

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Ready Reference Guides

Ready Reference Guides

Normal Laboratory Values

Tap to switch to the Consumer Version

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31	32 M	33	34	35	36	37 M	38	39	40

You need to provide IV potassium supplementation in a hypokalemic horse (serum potassium, 2.2 mEq/L) weighing 450 kg. You remember that potassium should not be given at a rate over 0.5 mEq/kg/hour.

Which of the following is the absolute highest safe amount of KCl to add to 10 L of 0.9% NaCl for administration at a rate of 2L/hour to this horse?

1 mEq/L	HIDE
2250 mEq	HIDE
450 mEq/L	HIDE
1125 mEq	HIDE
Need more information	HIDE

The addition of 1125 mEq to 10 L (or 112.5 mEq/L) of KCl is the highest safe dose this horse can receive (at 0.5 mEq/kg/hour).

Calculation:

Maximum rate of KCl you can give the horse is 0.5mEq/kg/hr

This horse weighs 450 kg

450 x 0.5 = 225 mEq

225 mEq/hr is the maximum rate of KCl this horse can safely receive

If you are making up a 10L bag of saline and running it at 2L/hr, this bag will last 5 hours

225 mEq/hr x 5 hr = 1125mEq