

Below are the real nutrition label and list of ingredients for classic (lemon-lime) Gatorade®:



Nutrition Facts	
1 serving per container	
Serving Size	20 fl oz (591 mL)
Amount Per Serving	
Calories	140
% Daily Value*	
Total Fat 0g	0%
Sodium 270mg	12%
Total Carbohydrate 36g	13%
Total Sugars 34g	
Includes 34g Added Sugars	69%
Protein 0g	
Potassium 80mg	0%
Not a significant source of saturated fat, <i>trans</i> fat, cholesterol, dietary fiber, vitamin D, calcium, and iron.	
*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.	

INGREDIENTS: Water, sugar [sucrose], dextrose [glucose], citric acid, salt [NaCl], sodium citrate, monopotassium phosphate, gum arabic, glycerol ester of rosin, natural flavor, yellow 5.

Reference Data

Substance	Symbol(s)	Molar mass
Water	H ₂ O	18 g/mol
Sodium chloride	NaCl	58.5 g/mol
Sodium ion	Na ⁺	23 g/mol
Chloride ion	Cl ⁻	35.5 g/mol
Dextrose (glucose)	C ₆ H ₁₂ O ₆	180.2 g/mol
Potassium ion	K ⁺	39.1 g/mol

Source of molar mass reference data: Wolfram|Alpha®. Certain molar masses have been rounded off.

Please answer the following questions to the best of your ability.

Note that all questions inquire about 1 L Gatorade®, so pay attention to that serving size!

1. What is the amount of sodium ion (Na⁺) in 1 L Gatorade®?
2. What is the total amount of potassium ion (K⁺) in 1 L Gatorade®?
3. **Assume that all chloride ion (Cl⁻) is derived from NaCl and KCl.** What is the amount of chloride ion (Cl⁻) in 1 L Gatorade®?
4. What is the mass of sodium chloride (NaCl) that would be needed to make 1 L Gatorade®?
5. What is the mass of potassium chloride (KCl) that would be needed to make 1 L Gatorade®?
6. **Assume that all carbohydrate is dextrose (glucose).** What is the total amount of dextrose (glucose) in 1 L Gatorade®?
7. What is the sodium ion (Na⁺) amount *concentration* for Gatorade®?
8. What is the potassium ion (K⁺) amount *concentration* for Gatorade®?
9. What is the chloride ion (Cl⁻) amount *concentration* for Gatorade®?
10. What is the dextrose (glucose) amount *concentration* for Gatorade®?

11. What would be the dextrose (glucose) amount *concentration* if expressed as a percentage? (Remember: $p\% = p \text{ g solute per dL solution.}$)
12. What is the calculated osmolarity of 1 L Gatorade®?
13. How does our calculated Gatorade® osmolarity compared to the normal value of human plasma/serum water osmolarity?
14. How does the “chemical anatomy” of Gatorade® compare to that of normal human plasma/serum?

For the next questions, we consider “physiologic fate”. Physiologic fate essentially means the *physical destination* of the solute and *how it is used metabolically* once it reaches its destination.

15. What is the physiological fate of Gatorade®-delivered sodium ion?
16. What is the physiological fate of Gatorade®-delivered potassium ion?
17. What is the physiological fate of Gatorade®-delivered chloride ion?
18. What is the physiological fate of Gatorade®-delivered citrate ion?
19. What is the physiological fate of Gatorade®-delivered dihydrogen phosphate ion?
20. What is the physiological fate of Gatorade®-delivered dextrose (glucose)?