Purpose
The purpose of this investigation is to determine the nature of the flow field, temperature distribution and heat and mass transfer in a triangular solar collector enclosure with a corrugated bottom wall in the unsteady condition numerically.

Design/methodology/approach
Non-linear governing partial differential equations (i.e. mass, momentum, energy and concentration equations) are transformed into a system of integral equations by applying the Galerkin weighted residual method. The integration involved in each of these terms is performed using Gauss’ quadrature method. The resulting non-linear algebraic equations are modified by the imposition of boundary conditions. Finally, Newton’s method is used to modify non-linear equations into the linear algebraic equations.

Findings
Both the buoyancy ratio and thermal Rayleigh number play an important role in controlling the mode of heat transfer and mass transfer.

Originality/value
Calculations are performed for various thermal Rayleigh numbers, buoyancy ratios and time periods. For each specific condition, streamline contours, isotherm contours and iso-concentration contours are obtained, and the variation in the overall Nusselt and Sherwood numbers is identified for different parameter combinations.