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APPLICATION OF THE DEFINITE INTEGRAL TO CHEMICAL TECHNOLOGY

Annotation: *Precise. integrals and their chemistry to technology implementation is very wide and many edge topic be, chemistry and technological processes mathematician in terms of in modeling very important importance has. Determined integrals mainly materials and energy of the flow distribution, reactions kinetics, diffusion processes and other various chemical events analysis in doing is used. Below clear integrals chemistry to technology of application some main directions seeing will be released.*

Keywords: *integral, definite integral, chemical reaction, reaction speed, concentration, time, reactor, chemical reactor, diffusion.*

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1. Chemical Reactions Model to do.

Chemistry in technology clear integrals, chemical reactions kinetics and mechanics according to model in creation Chemical reactions in learning, especially in reaction speed and catalytic processes important importance has.

A. Reaction speed and concentration.

Chemical reaction speed usually concentrations to time related change with is described. If any if the reaction is A→B and reaction speed as follows if given:

$$r = -k[A]^n$$

This on the ground:

- r— reaction speed,
- k— reaction rate coefficient,
- $[A]$— Aconcentration of the substance,
- n— reaction order.

If If A the concentration $[A](t)$ of a substance depends on time, then by using the definite integral, we can find the time dependence of this concentration . change calculation For example, if the reaction order first level if, then integration as follows will be:

$$\frac{d[A]}{dt} = -k[A].$$

This equation integration through concentration to time related change find possible:

$$[A](t) = [A]_0 e^{-kt}.$$

This formula is chemical reaction during substances concentration to time related change represents.

B. Catalytic Reactions.

Catalysts work mechanism also clear in learning integrals Catalytic in processes, for example, reactions sequence or reaction and catalyst mutual impact modeling integral calculations for necessary.

2. Diffusion and Massani Distribution.

Diffusion processes chemistry in technology very important place holds, because many processes, for example, chemical reactors, mutual effects or absorption and adsorption processes diffusion through done is increased.

A. Diffusion equations.

Diffusion processes, for example, Fick's law is based on:

$$J = -D\frac{\partial C}{\partial x}.$$

This on the ground:

- J— substance flow (mass distribution rate),
- D— diffusion coefficient,
- C— concentration,
- x— distance in space.

If the concentration time and into space related if so, this equations using definite integral is solved. For example, if diffusion process to time looking at change need if, Fick's second law as follows is written:

$$\frac{\partial C}{\partial t} = D\frac{\partial^2 C}{\partial x^2}.$$

This equation can be solved using integrals. solution through substances spread to time related change calculation possible.

B. Mass General Flow.

Chemistry in technology of the mass general flow, for example, reactors and related in systems, many processes by controlled. Mass. spread study for integral application necessary, because this in systems one or one how many components together diffusion and reactions there is.

3. Thermodynamics and Energy Flow.

Chemistry in technology energy currents calculation for clear of the integral application very important. Thermodynamics processes, especially enthalpy, enthalpy change, and work to perform such as energy in modeling changes integrals is used.

A. Energy flow and heat exchange.

Chemistry in technology heat exchange processes, such as heaters, condensers, and in evaporators energy balance calculation for need a definite integral If the system heat flow time and to phase related if so, it clear integration through analysis to do possible.

B. Reaction heat.

Chemical reactions heat change calculation for reaction enthalpy integral to take need to be possible. For example , exothermic or endothermic reaction during of the system heat change using definite integral is found.

4. Reactor Design and Optimal Performance.

Chemistry in technology, especially reactors and chemical working release in the processes clear integral application, system efficiency maximum to the level lift for It is necessary. the following includes:

A. Reactors for materials and energy balance.

Reactor in systems, for example, continuous and party in reactors, material and energy balances Integral is used in calculation. Through this in the system of substances flow, reaction speed and thermodynamic changes determination possible.

B. Optimal operating conditions.

Reactor optimal work in design conditions (e.g., temperature, pressure, and concentration (determination) for clear integrals using of the system work activity optimization possible. These conditions the reactor maximum in efficiency use for will be necessary.

5. Ovens and Heat Exchange In the processes.

Furnaces, distillation columns and other heat exchange in systems of heat spread and energy flow in calculation using definite integral following issues solution possible:

- **Heat exchange Speed**: On devices energy exchange and heat Modeling change.
- **Maximum efficiency find**: Chemical working release processes heat flow with how connected and this streams effective to manage to determine.

Conclusion. Precise integrals chemistry in technology very important tool is different processes mathematician in terms of in modeling They are used. chemical reactions kinetics, mass distribution processes, energy balance and thermodynamic changes analysis in doing help Chemistry in technology clear integral use, processes optimization and efficiency increase for It is necessary.

LITERATURE

1. H. A. Rahmatulin. Fundamentals of gas dynamics of interpenetrating movements of a compressed medium. Pmm, 20, no.2, 1956.
2. N. A. Mamadaliyev. About the movement of bodies at a speed higher than sound in a two-component environment. Izv. Academy of Sciences of the uzssr, a number of technologies. Sciences, 1966 No. 1.
3. R. I. Nigmatulin. The degree of hydromechanics and compression waves in a two-speed and two-temperature constant medium in the presence of phase changes. Izv 1967 No. 5.
4. T. A. Djalilova. Rapid leakage of a thin wedge and cone sound with a gas flow with particles, taking into account heat exchange and particle reflection. Academician of Sciences of Izvestia SSR, series of technical sciences, 1976, No. 3, article.

5. T. A. Djalilova. Dissertation on the topic:"the study of the flow of flat and excimetric bodies with a gas flow with solid particles, taking into account the heat exchange between phases and the reflection of particles from the solid surface." 01.02.02-fluid, gas and plasma mechanics. 24. 10. 1978 year.
6. Murodiljon, K., Gulhayo, K., & Bobur, K. (2022). Ayrim kimyoviy reaksiyalarni tenglamalar yordamida yeching. *Biznesni boshlash va ochiq jamiyat Yevropa jurnali* , *2* (1), 45-48.
7. Джалилова, Т. А., Комолова, Г. Ш. К., & Халилов, М. Д. У. (2022). О распространении сферической волны в нелинейно-сжимаемой и упругопластической средах. *Oriental renaissance: Innovative, educational, natural and social sciences*, *2*(3), 87-92.
8. Комолова, Г., & Халилов, М. Stages of drawing up a mathematical model of the economic issue. *Journal of ethics anddiversity in international communication. Испания-2022*, *60*, 45-48.
9. Murodiljon, K., & Donyorbek, T. (2021). Limit tushunchasini shakllantirishda matematika va fizika o‘rtasidagi bog‘liqlikdan foydalanish tajribasi. *Ta'lim va tahlili onlayn ilmiy jurnali* , *1* (6), 212-215.
10. Komolova, G., Xalilov, M., & Komiljonov, B. Tenglamalar yordamida ba’zi kimyoviy reaksiyalarni yechish. *Yevropa biznes startaplari va ochiq jamiyat jurnali.-2022.-2-jild.-Yo'q*, *1*(8), 45-48.
11. Djalilova, T., Komolova, G., & Xalilov, M. (2022). О распространении сферической волны в нелинейно-сжимаемой и упругопластической средах. *Oriental Renaissance: Innovative, educational, natural and social sciences jurnali*, 2181-1784.
12. Xalilov, M. D., & Komiljonov, B. K. (2022). Komolova GS garmonik skaliar vibrasyonlarning kompleksi va vektor foydalanishi. *Miasto Przyszłości*, 341-344.
13. Xalilov, M. D., Komiljonov, B. K., & Komolova, G. S. (2022). Complex and vector expression of harmonic scaliar vibrations. *Miasto Przyszłości*, *24*, 341-344.
14. Komolova, G., Khalilov, M., & Komiljonov, B. (2022). Solve Some Chemical Reactions Using Equations. *European Journal of Business Startups and Open Society*, *2*(1).
15. Дурбекович, М. Х., & Бобур, К. К. (2023, January). Об особых точках решений многомерной системы в комплексной области. In *"usa" international scientific and practical conference topical issues of science* (vol. 8, no. 1).
16. Ergashov, S., Komiljonov, B., & Xalilov, M. Differensial tenglamalarni mexanika va fizikaning ba’zi masalalarini yechishga tadbiqlari. *Namangan muhandislik texnologiyalari instituti ilmiy-texnika jurnali*, 430-433.
17. Komolova G., Khalilov M., Komiljonov B. Solve Some Chemical Reactions Using Equations //European Journal of Business Startups and Open Society. – 2022. – Т. 2. – №. 1.
18. Komolova, G., & Khalilov, M. Stages of drawing up a mathematical model of the economic issue. *Journal of Ethics and Diversity in International Communication jurnali, e-ISSN*, 2792-4017.
19. Abdujalilovna, DT, Sayibjon, K., Shukirillayevna, KG, & Durbekovich, KM (2023). Qattiq zarrachalar bilan ikki fazali vosita bilan yupqa profil atrofida oqim. *Farmatsevtikaning salbiy natijalari jurnali* , 3592-3596.
20. Xalilov, M. D., Komiljonov, B. K., & Komolova, G. S. Garmonik skalyar tebranishlarning kompleks va vektor ifodalanishi. *Miasto Przyszłości. ISSN-L*.

21. Muradiljon, K., & Mashxuraxon, S. (2023). Application of the Theory of Linear Differential Equations to the Study of Some Oscillations.
22. Акбарова, С. Х., & Халилов, М. Д. (2019). О краевой задаче для смешанно-параболического уравнения. In *Andijan State University named after ZM Babur Institute of Mathematics of Uzbekistan Academy of Science National University of Uzbekistan named after Mirzo Ulugbek Scientific Conference* (pp. 88-89).
23. Акбарова, С. Х., Акбарова, М. Х., & Халилов, М. Д. (2019). О разрешимости нелокальной краевой задачи для смешанно–параболического уравнения. *International scientific journal «global science and innovations*, 130-131.
24. Abdujalilovna, D. T., Murodiljon, K., Axrorbek, O., & Bexzod, T. (2023). Some studies of the flow of a two-phase medium with solid particles around bodies with a significant concentration of particles. *Pedagogical sciences and teaching methods*, 52.
25. Abdujalilovna, D. T., & Durbek, K. M. (2023). Extreme Problems and Their Study in a Mathematics Course. *American Journal of Public Diplomacy and International Studies (2993-2157)*, *1*(10), 113-118.
26. Abdujalilovna, D. T., Murodiljon, K., Axrorbek, O., & Bexzod, T. (2023). Impact of solid particles of a two-phase flow on a wedge (direct problem). *Sustainability of education, socio-economic science theory*, *2*(13), 299-303.
27. Халилов, М. Д., & Комилжонов, Б. К. (2022). Differensial tenglamaga olib keluvchi ba'zi masalalar. *Journal of Advanced Research and Stability*.
28. Ergashev Sultonmurod, K. B. (2021). Differensial tenglamalarni mehanika va fizikaning bazi masalalarini yechishga tadbiqlari. *Наманган муҳандисликтехнология институти илмий-техника журнали*, 430-433.
29. Bobur, K. (2024). Application of Operational Calculus and Laplac Exchanges to Electrical Mechanics. *Miasto Przyszłości*, *55*, 459-463.
30. Джалилова, Т., & Халилов, М. (2024). Распространение двумерных пластичных волн в полуплоскости. *Theoretical aspects in the formation of pedagogical sciences*, *3*(10), 102-106.