HYDROCHEMICAL FACIES OF THE FLUVIAL WATERS AND THEIR ZONING

By G. A. MAXIMOVICH

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A particular portion of a river is, however, distinguished by its own specific physical-chemical conditions of formation, concentration and mineral composition of water. Consequently, the water in different parts of a river is of different concentration and chemical composition, both changing within definite limits and persisting through a rather considerable space of time. It is therefore possible to speak of hydrochemical facies of rivers.

The meaning conveyed by the term is that the bed of a river can be divided into separate portions, each characterized by the predominance in its water of some dissolved substance, or set of substances (ions, colloids, etc.). The concentration and mineralogical composition may change within certain limits, but the predominant substances must continue so throughout the portion.

It is generally assumed that the composition of fluvial waters (which are complex solutions consisting of many components) depends on the character of rocks occurring in the river basin ([9–12], [14–16]). This opinion is encouraged by the practice of evaluating the hydrochemical materials according to Stabler (“) and Palmer ([18]), whereby such an important factor as concentration is lost sight of. Even Clarke ([15]), whose materials have been widely used by the author, overlooked the concentration factor, although he took into consideration the percentage composition of such components as $Si0_2$, $A1_20_3$, Fe_20_3, which are considered to be colloids according to Palmer and drop out of the calculation when the hydrochemical analyses are expressed domain, but may also complete their number. Besides those mentioned here, there are other possible hydrochemical facies of lower stability (especially sulphate and chloride ones), but we shall not enter into their discussion until more is known about them.

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Hydrochemical Facies of Fluvial Waters

Facies groups	Facies	Mineralization in 0.0001%	Number of		Rivers
			rivers	analyses	
Siliceous	Siliceous chloride sodium	17	1	1	The Eger at its source (tributary of the Elbe)
	Siliceous chloride calcium	17	1	1	The Saale at its source (tributary of the Elbe)
	Siliceous sulphatic carbonaceous	30	1	1	The Iltz (tributary of the Danube)
	Siliceous sulphatic carbonaceous	13–47	2	2	The Erlau, source of the Elbe (tributary of the Danube)
	Siliceous hydrocarbonaceous calcium	37–87	15	278	The Amazon, Uruguay; the rivers of India, British Guiana and the Georgia, Oregon, Washington and Carolina states in the USA
	Siliceous (hydro)carbonaceous sodium	16–91	14	254	The Laplata; the rivers of British Guiana and of the Georgia, Carolina, Virginia states, USA; the source of the Elbe
	Siliceous hydrocarbonaceous chloride	98	1	1	The Parana river
		13–98	35	538	
Calcium	Calcium sulphatic hydrocarbonaceous	91	1	1	The Oder near Breslau (during high water)
Hydrocarbonaceous	Hydrocarbonaceous siliceous ferrous	45	1	1	British Guiana (one river)
	Hydrocarbonaceous siliceous sodium	57	1	1	Carolina (USA) (one river)
	Hydrocarbonaceous siliceous calcium	37–170	22	456	The Loire, Garonne, Blue Nile rivers; the tributaries of the Amazon and Danube; the rivers of Sweden and the USA: Oregon, Washington, Alabama, Virginia; Canada
	Hydrocarbonaceous siliceous sulphatic	46–181	5	75	The rivers of Java, Oregon, Washington and California
	Hydrocarbonaceous sulphatic siliceous	99–121	2	38	The Pekationgath (Java) and Jokima (Washington)
	Hydrocarbonaceous calcium siliceous	125–320	16	274	The Seine, Daubs (France); the rivers of Sweden; the Rhine, the Yukon, the Mississippi; the rivers of California, Kansas; Washington, Virginia; the St. Lawrence River
	Hydrocarbonaceous sodium siliceous	153–156	2	3	Nevada (1 river), Ana (Oregon)
	Hydrocarbonaceous calcium sodium	19–160	5	5	Sweden (2 rivers); Alaska (1 river); the Rio Primero river (Argentina), Ireland (1 river)
	Hydrocarbonaceous calcium sulphatic	74–422	60	887	The Kama, Volga, Tura, Dniester, Danube and many of its tributaries, Vistula, Elbe, Rhine, Main, Rhone, Maas, Dauro, Thames, Switzerland (1 river), Nile (the lower course), the Red River, Yukon, Tanaka, Coper river, Columbia (1 river); the Lost, Russan, St. Gabriele, St. Anne, Aiowa, Peder, Cascade, Rock River (Columbia); the Arkansas, Mississippi rivers, Illinois, Canada
	Hydrocarbonaceous calcium chloride	31–455	2	2	The Dee (Scotland); the Veber (Yuta)
	Hydrocarbonaceous sodium calcium	27–174	2	4	The White Nile, Klarelf (Sweden)
	Hydrocarbonaceous calcium magnium	185–267	6	41	The Lost river, Red River, Rock River, the City-Creek, the Bair (USA); Danube; the Vetluga (USSR)
	Hydrocarbonaceous sulphate calcium	80–554	20	400	The Main, the Saale, Argentina, Canada (Assinoboya and Saskatchewan); Salainese (California); the Mississippi; the tributary of the Colorado; the Kansas; the rivers of the Wisconsin, Aiowa, Pennsylvania, Idaho, Nebraska, Minnesota, N. Y. states
	Hydrocarbonaceous sulphate chloride	187	1	1	The N. Dvina near Archangel
	Hydrocarbonaceous sulphate sodium	221	1	37	Oregon in the USA (1 river)
	Hydrocarbonaceous sodium sulphate	180–339	2	37	The Valk (Nevada), Owens (California)
	Hydrocarbonaceous chloride calcium	320–450	4	73	The Om near Omsk, the Colorado (Texas), the West River (Indiana), the Ogden (Yuta)
		19–554	152	2335	
Sulphatic	Sulphate hydrocarbonaceous siliceous	48	1	38	The Andrioscoggin (USA)
	Sulphate hydrocarbonaceous sodium	112–2842	2	2	The Rio-Frio Chile); the Uil (the arm of the Karasay, Kazakhstan)
	Sulphate hydrocarbonaceous calcium	180–714	10	220	The Chusovaya, the Missouri with its tributaries; the rivers of Nebraska, New Mexico, California; the Elbe, Vezer; the Nelson (Canada)
	Sulphate calcium hydrocarbonaceous	81–958	5	76	Colorado, Ohio; the Potomac river (the tributary of the Danube); Sweden (1 river)
	Sulphate calcium sodium	1011–2412	3	38	The Colorado (USA); the Santa Maria (California); the Arkansas
	Sulphate chloride calcium	651	1	1	The Colorado (Argentina)
	Sulphate chloride sodium	561–14950	8	116	The Kansas, Pecos, Rio-Grande, Colorado, Rio-Saladillo (Argentina), Shellif (Algeria)
	Sulphate sodium calcium	1136–2134	1	60	The Atrek (Asia); the Arkansas river
		48–14950	31	951	
Chloride	Chloride hydrocarbonaceous sulphate	183	1	36	San Joukhin (California)
	Chloride hydrocarbonaceous sodium	637	1	1	The Bair river (Yuta)
	Chloride sodium hydrocarbonaceous	7700	1	1	The Jordan (Palestina)
	Chloride sulphate sodium	892–9185	3	33	The Brazos (Texas); Rio de Los Papagaios (Argentina); the Jordan (Yuta)

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