Physiochemical analysis of acacia Senegal Arabic gum collected from different parts of Sudan

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Abstract

Background: Gum Arabic is the oldest and best known of all natural gums. Its use can be traced back to the third millennium B.C., They have been important items of international trade in the food, pharmaceutical, adhesive, paper, textile, and other industries for centuries.

Objective: To study the Physiochemical properties of acacia Senegal Arabic gum collected from different parts of Sudan

Methods: The gum samples used in this work were relatively pure and free from impurities such as wood pieces, and etc. Representative specimens were grounded using a mortar and pestle. A number of physiochemical and chemical methods were used to characterize the Acacia senegal gum, these methods included determination of moister and ash content, specific rotation, intrinsic viscosity, nitrogen and protein content Microsoft Excel program used for data analysis.The Intrinsic Viscosity levels of crude gum, fraction (I) and fraction (II). It was found to be 15.02, 34.259 and 5.005 respectively. The results indicated that there was significant difference between the three obtained [η] values the hights was for fraction (I).

Results: Ten samples of Acacia Senegal gum were used. Three samples were collected from West Kordufan, Senar region and Alobyed region. Other samples were provided by the Gum Arabic Company Ltd. Ash percentage shown in Table (3.1.) of A. senegal gum samples ranged between 2.62% and 3.52%. Moisture percentage shown in Table (4.1.) ranged between 11.86% and 14.53%. Percentage of Nitrogen and Protein of the Crude gum and the fractions (I) and (II). The chemical methods were used for estimation the amino acid content of gum Arabic samples (Acacia senegal).Table (3.6) shows the percentage of amino acids content of acacia Senegal gum (Sample 1, 2, 3). Table (3.6.), (3.7.) and (3.8.) show the amino acid content of crude gum, fraction (1) high protein content) and fraction (II) low protein content respectively.

Conclusion: The examination of samples from Acacia senegal obtained from various Sudanese sources showed that they possessed very similar chemical and physiochemical characteristics despite their different geographical origins. The characteristics of all Acacia Senegal samples have been found to confirm to the literature data for gums from Acacia senegal. Fractionation of gum Arabic from Acacia senegal by foaming method into two fractions, high protein content (fraction I) that represent 30% of the gum and low protein content (fraction II) which represent 70% of the gum. The proximate analysis of the crude gum, fraction I and fraction II revealed that the moisture percentage of crude gum where in agree with literature.

Key words: Acacia, Senegal Arabic gum, physiochemical analysis, collection

{**Citation**: Mai Makki, Eltaib, S. A. Lina, M Osman, A Hassan. Physiochemical analysis of acacia Senegal Arabic gum collected from different parts of Sudan. American Journal of Research Communication, 2018, 6(10): 34-58} www.usa-journals.com, ISSN: 2325-4076.

1. Historical background

Exudate gums are amongst the oldest natural gums: about 5,000 years ago they were used as thickening and stabilizing agents. The three major exudates gums: gum Arabic, gum tragacanth, and gum karaya possess a unique range of functionalities (Phillips and Williams 2001). They have been important items of international trade in the food, pharmaceutical, adhesive, paper, textile, and other industries for centuries.

Gum Arabic is the oldest and best known of all natural gums. Its use can be traced back to the third millennium B.C., the time of the ancient Egyptians. Early Egyptian fleets shipped gum Arabic as an article of commerce. It was used as a pigment binder and adhesive in paints for making hieroglyphs, and ancient inscriptions refer to it as kami. Furthermore, it was used as a binder in cosmetics and inks and as an adhering agent to make flaxen wrappings for embalming mummies. Introduced in Europe through various Arabian ports, it was called gum Arabic after its place of origin. During the middle Ages, gum Arabic trade was controlled by the Turkish Empire, giving rise to the name turkey gum.

Gum karaya has a more recent history and has only been used commercially for about 100 years. In the early 1900s, it was introduced on the market as an adulterant or alternative for gum tragacanth, due to the great similarity between both gums (Dziezak 1991).

Gum karaya

Most commercial gum karaya is obtained from Sterculia urens, a large, bushy deciduous tree that can grow up to 15 m high. It is found on the dry, rocky hills and plateaus of central and northern India. Other sources are the related species S. villosa that occurs in India and Pakistan and S. setigera that grows in some North African countries, such as Sudan, Senegal, and Mali.

Gum tragacanth

Most commercial gum tragacanth is obtained from Astragalus gummifer Labill. and A. microcephalus Willd., but the contribution of other species such as A. *adscencens Boiss*., A. *echidnaeformis Sirjaev*, A. *gossypinus Fisch*., and A. *kurdicus Boiss*. Are significant, These small shrubs, varying in height from hardly 10cm (A. *microcephalus*) up to 1 m (A. gummifer), which grow in the highlands and deserts of Turkey, Iran, Iraq, Syria, Lebanon, Afghanistan, Pakistan, and Russia (Gecgil *et al*. 1975). Iran dominates the gum tragacanth market and supplies the highest quality gum. Turkey is the second largest producer, but Turkish gum is considered of inferior quality. Much smaller amounts of gum are exported by Afghanistan and Syria.

Collection and processing

Although natural exudates are sometimes harvested, virtually all exudates gum is tapped. When *Acacia* trees lose their leaves and become dormant at the beginning of the dry season, usually by the end of October or beginning of November, superficial incisions are made in the branches and bands of bark are stripped off. After 5 weeks, gum is manually collected as partially dried tears. This collection is repeated at 15-day intervals up to five or six collections in total, depending on the weather conditions and the health of the tree (Imeson 1992). After collection, the gum is cleaned and graded. This is traditionally done by women, who manually sort the gum according to the size of the lumps and remove foreign matter (FAO, 1995). Since the 1990s, cleaning has also been performed mechanically using conveyor belts and sieving

machines. In Sudan, the gum from *A. senegal* (Hashab) is presented in various grades, listed in Table 1.

Table [1.1.]: Commercial grades of *Acacia senegal* gum from Sudan (Islam *et al.*, 1997)

Grade	Description
Hand-picked selected	The cleanest and largest pieces with the lightest color. The most expensive grade
Cleaned and sifted	The material which remains after hand-picked selected and siftings are removed. This grade comprises whole and broken lumps with a pale to dark amber color
Cleaned	The standard grade with a light to dark amber color. It contains sifting but the removed
Siftings	The residue formed by softening the above, more choice grades. This grade contains a proportion of sand, dirt, and bark.
Dust	This grade is collected after the cleaning process and comprises very fine particles of gum sand, and dirt
Red	Dark red gum particles removed from other lumps

2. Experimental (Materials and method)

2.1. Materials:

Ten samples of *Acacia* Senegal gum were used. Three samples were collected from West Kordufan, Senar region and Alobyed region. Other samples were provided by the Gum Arabic Company Ltd.

2.2. Methods:

2.2.1Authentication of sample:

2.2.1.1 Purification of the gum Arabic:

The gum samples used in this work were relatively pure and free from impurities such as wood pieces, and etc. Representative specimens were grounded using a mortar and pestle.

2.2.2 Determination of moisture content:

Gum Arabic samples were accurately weighed. Samples were heated in an oven at 105^0C constant temperature for 24 hours or till constant weight was observed. The dry specimens were allowed to cool in desiccators, and the loss of weight was calculated as percentage from the initial weight using the following relation. (FAO.1990).

$$\% \text{ Moisture} = \frac{\text{Weight of water evaporate in grams}}{\text{Weight of sample in grams}} \text{ X } 100$$

3. Results and Discussion

3.1. Results

3.1.1. Characterization of Acacia senegal gums:

A number of physiochemical and chemical methods were used to characterize the Acacia senegal gum, these methods included determination of moister and ash content, specific rotation, intrinsic viscosity, nitrogen and protein content. Table (3.1.) shows the percentage of moisture and ash content of *A. senegal* gum.

Table shows that moisture content of the samples fall within the ranges of Anderson et al in study of *Acacia senegal* trees grown on heavy soils reported an average ash content of 11.86% and a value of 18.89% for trees grown on sandy soil.

The ash of bulk sample ranged from 2.6 to 3.42 while the ash content of *senegal* nodule ranged from 3.2 to 3.39%. Samples of different ages varied in ash percent from 3.2 to 4.63 Anderson reported an ash content value of 3.93% for Acacia *senegal* gum.

In (1983) Anderson reported value of 3.9% ash content for authenticated sample and 4.4% for commercial samples of *Acacia senegal* gum.

3.1.2. Chemical analysis of *Acacia senegal* gum samples (Crude gum)

Table (3-1): Moisture and Ash percentage of crude *Acacia senegal* gum samples

Sample source	Moisture (%)	Ash (%)
Alobied 1	12.21	3.42
Alobied 2	13.75	2.95
Alobied 3	11.95	2.62
Senar 1	14.12	3.52
Senar 2	12.85	3.21
Senar 3	14.00	2.98
West kordfan 1	11.86	3.12
West kordfan 2	18.89	3.51
G.A.company 1	12.95	2.99
G.A.company 2	14.53	3.30
Average	13.711	3.162

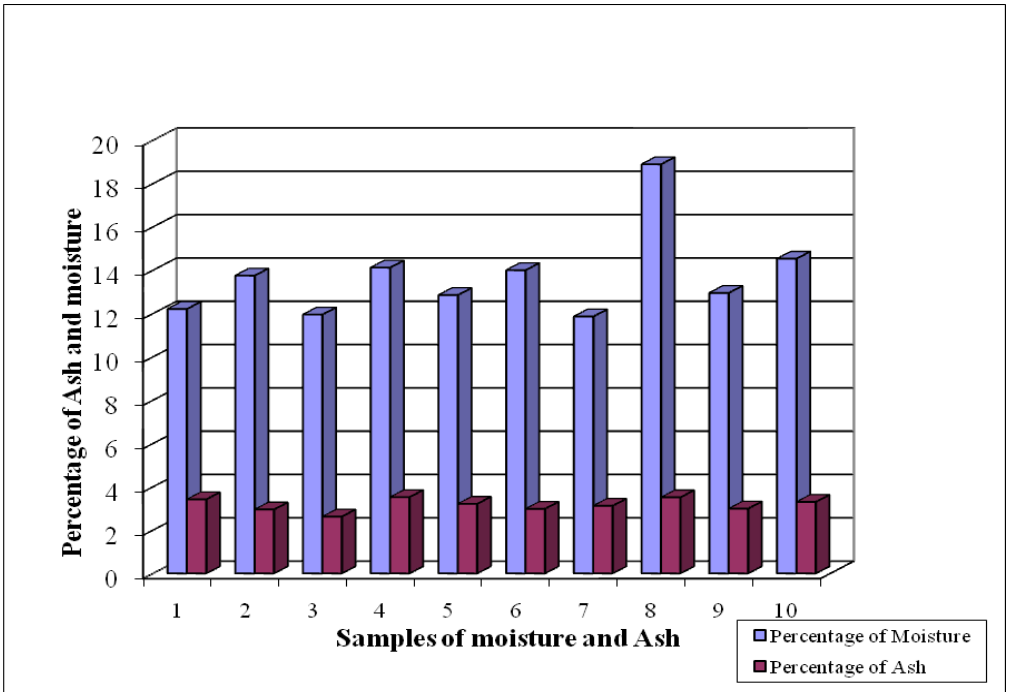


Fig (3.1.): Moisture and Ash percentage of Crude *Acacia senegal* gum samples.

Ash percentage shown in Table (3.1.) of *A. senegal* gum samples ranged between 2.62% and 3.52%. Moisture percentage shown in Table (4.1.) ranged between 11.86% and 14.53%.

These average values and the appearance of the samples. fully agree with gum Arabic specification cited in FAO food and nutrition paper 52 (FAO, 1991), , which state that the loss on drying and total ash percentage as a parity test for gum Arabic should not exceed 15% and 4% respectively. The Join Expert Committee for Food Additives (JECFA) of FAO (FAO, 1998), adds to the above definition a description of gum Arabic as a pale white to orange – brown solid, which breaks with a glassy fracture. When ground, the pieces are paler and have a glassy appearance.

Table (3.2): Moisture and Ash percentage content of fractions (I) and (II) of *Acacia senegal* Gum

Sample Source	Moisture (%)		Ash (%)	
	Fraction I	Fraction II	Fraction I	Fraction II
Alobyed 1	11.25	11.20	2.31	2.98
Alobyed 2	12.02	12.50	2.72	2.51
Alobyed 3	11.83	11.62	2.11	2.00
Senar 1	13.95	13.82	3.25	3.21
Senar 2	12.22	12.15	3.00	2.97
Senar 3	13.00	12.95	2.53	2.44
Westkordfan	10.24	10.35	2.96	2.50
Westkordfan	12.33	12.28	3.33	3.31
G.Acompany	11.92	11.86	2.75	2.71
G.Acompany	14.42	14.35	2.96	2.84
Average	12.318	12.308	2.792	2.747

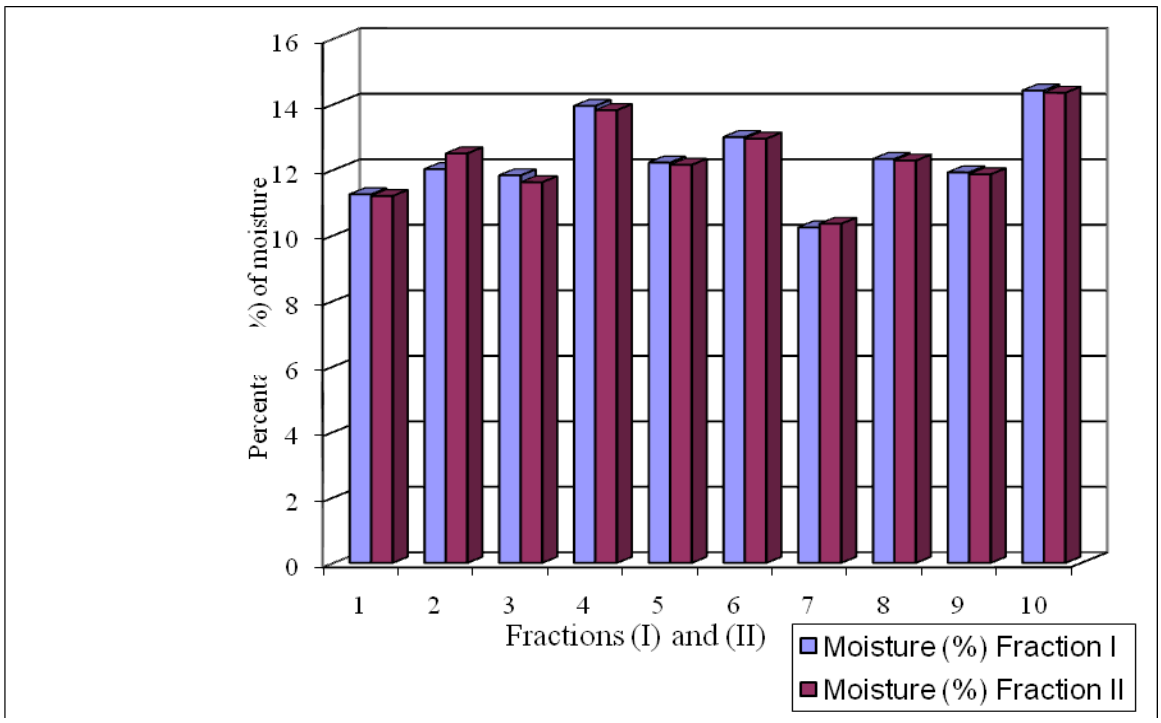


Fig. (3.2.a): Moisture percentage content in fractions (I) and (II) of *Acacia senegal* Gum.

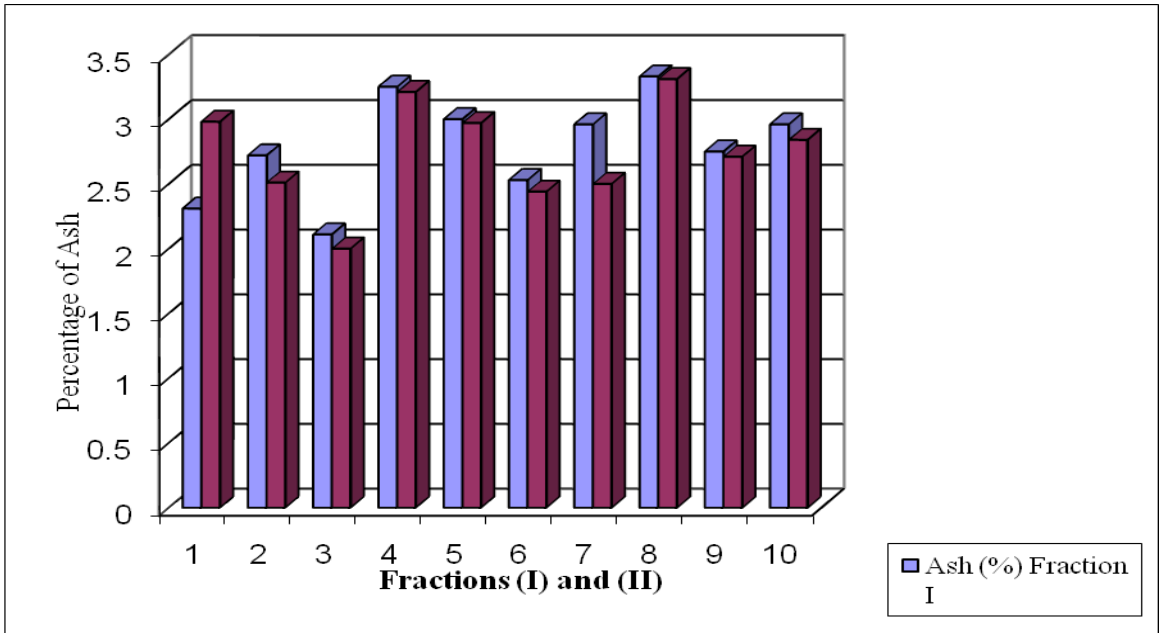


Fig. (3.2.b): Ash percentage content in fractions (I) and (II) of *Acacia senegal* Gum .

Table (3.3.): Specific optical rotation of the Crude gum and its Fractions (I) and (II)

Sample Source	Specific rotation		
	Crude gum	Fraction I	Fraction II
Alobyed 1	-33^0	-32^0	-32^0
Alobyed 2	-32	-30^0	-30^0
Alobyed 3	-36	-34	-33
Senar 1	-31	-30	-31
Senar 2	-32	-30	-30
Senar 3	-29	-28	-28
Westkordfan	-27	-33	-32
Westkordfan	-27	-26	-25
G.Acompany	-30	-30	-30
G.Acompany	-34	-32	-31
Averge	-31.1	-30.5	-30.2

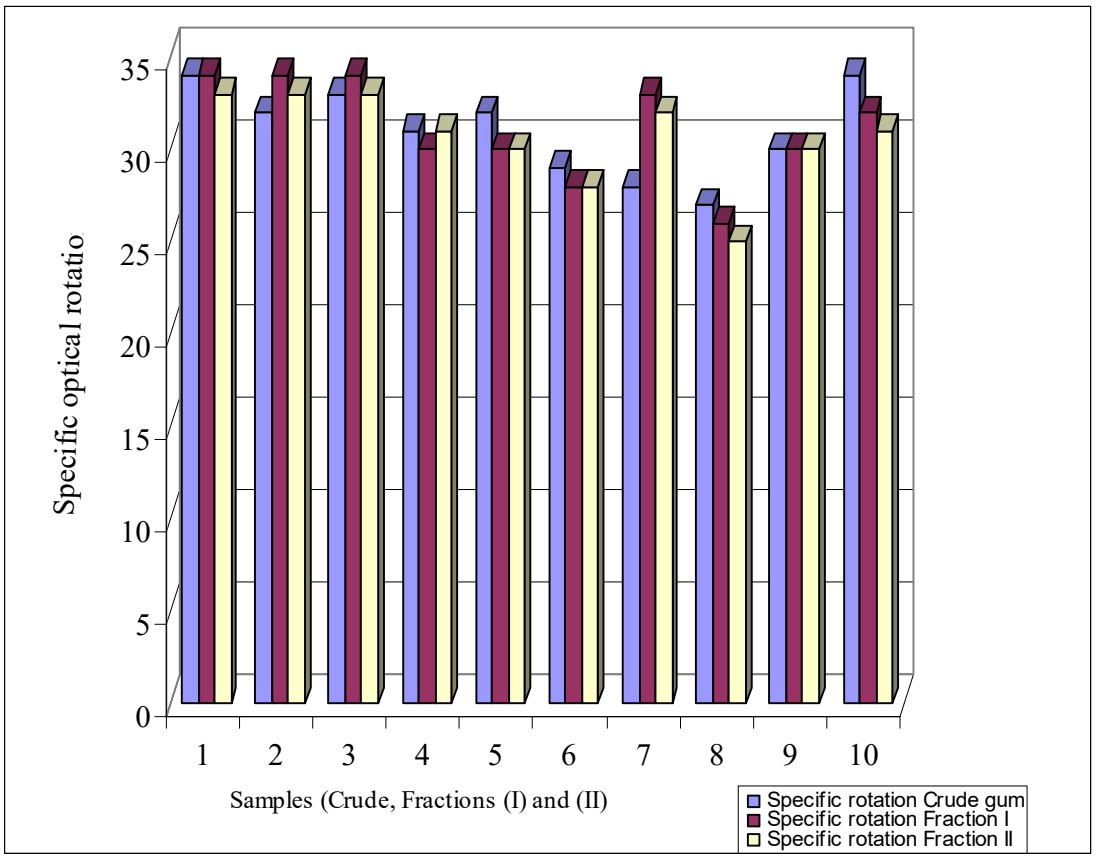


Fig (3.3.): Specific optical rotation of the Crude gum, fractions (I) and fraction (II).

Table (3.4.): Intrinsic Viscosity (ml/g) of the Crude gum and fractions (I) and (II)

Sample source	Intrinsic Viscosity		
	Crude gum	Fraction I	Fraction II
Alobyed 1	15.32	33.51	4.21
Alobyed 2	17.11	34.29	5.29
Alobyed 3	14.50	40.00	4.06
Senar 1	13.22	35.26	5.56
Senar 2	15.89*	42.11	5.22
Senar 3	15.55	30.17	3.33
Westkordfan	13.92	26.53	4.13
Westkordfan	15.00	29.64	8.92
G.Acompany	16.21	39.46	5.21
G.Acompany	13.53	31.62	4.12
Averge	15.025	34.259	5.005

Table (3.4) shows the Intrinsic Viscosity levels of crude gum, fraction (I) and fraction (II). It was found to be 15.02, 34.259 and 5.005 respectively. The results indicated that there was significant difference between the three obtained [η] values the hights was for fraction (I).

The viscosity of a liquid (as mentioned before) is a measure of its resistance to flow and as such reflects the frictional forces between the molecules.

Recent studies indicated that: the low viscosity of gum Arabic is due to its globular structure. Fincher, *et al*. (1983) it's well known that the viscosity of a polymer solution is a function of the size and shape of its molecules and the conformation they adopt in the solvent. The shape of poly saccharide molecules in solution are a function of oscillation around the bonds of the glycosidic linkage, the greater the number of conformations available to each individual segment, the less likely for a chain to adopt a particular shape and more numerous the resulting intra – and inter – molecular collisions that creat friction and produce viscosity. (Buffo, *et al,* (2000)

Asingle cleavage of glycosidic bond at the center of the chain by hydrolysis,oxidation or mechanical energy, such as shear, produces tow polymer molecules of one – half the original molecular waight and much lower viscosity – producing potentinal each half of the molecule, because the radius of the volum it sweeps upon gyration is one – half that of the original molecule. Sweeps out asphere of but one – eight the volum of the original molecule, resulting in a viscosity of only one – fourth the original value (Whistler and Bemiller, 1997)

It is there for possible that pasteurization had induced thermal hydrolysis in the gum breaking the molecular entanglement and reducing the effective volume and consequently the viscosity. (Buffo, *et al*. 2000)

It could be suggested that: Increased viscosity is a result of change in the shape of gum molecule after distribution so it will be less globulars and fraction I where AGP so it reased the risitanats of fluid to flow and it may be linear molecules and it is well known that linear molecules have higher viscosity than globular molecules Randall, Phillips and Williams(1989a) using hydrophobic affinity chromatography, have shown that the gum consists of three distinct fractions: a high molecular mass arabinogalactan – protein complex (AGP) containing most of the total protein, glycoprotein (G1) containing the rest of the protein, and a lower molecular mass fractions and arabinogalactan polysaccharide, which is protein – deficient (AG). The AGP fraction is mostely responsible for the high internsic viscosity of fraction(I). (William *et al* 1990)

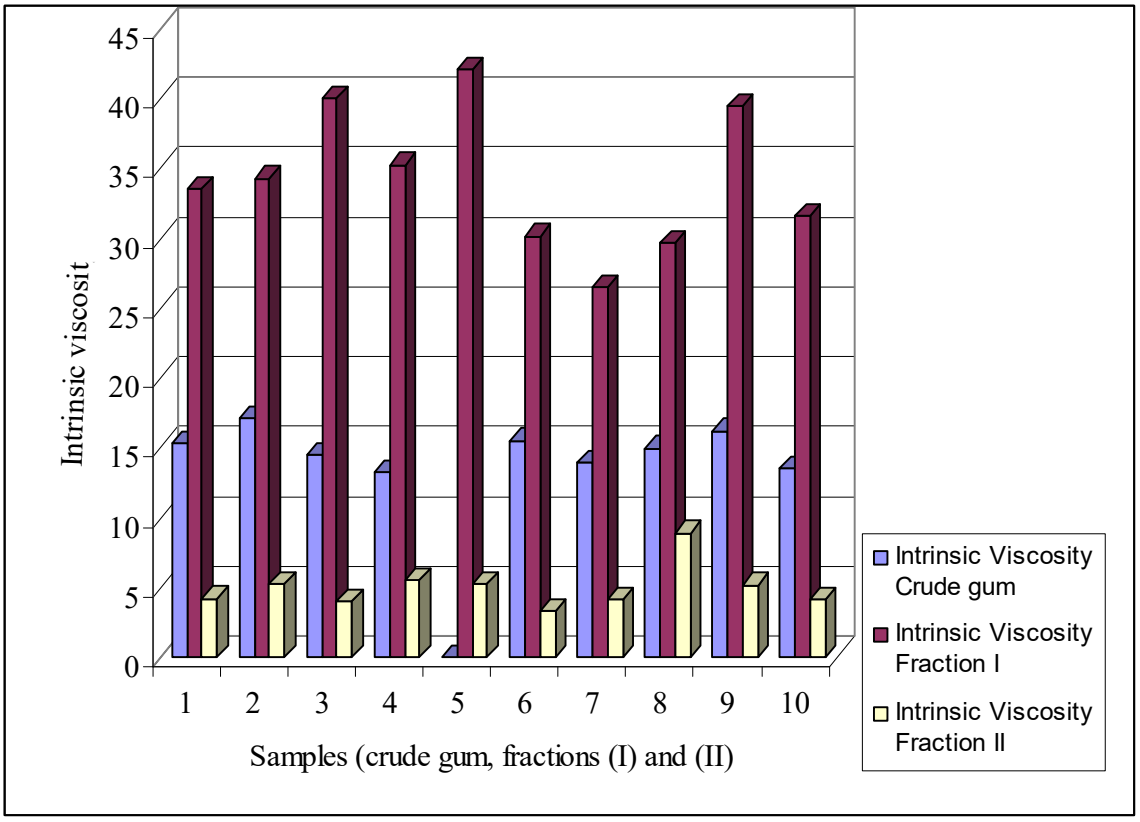


Fig. (3.4) : Intrinsic Viscosity (ml/g) of the Crude gum and fractions (I) and (II) Nitrogen and protein content calculated using nitrogen conversion factor 6.6 (Anderson, 1986).

Table (3.5.) show the average of nitrogen and protein content of crude *Acacia senegal* gum and it's two fractions, high protein content fractions and low protein content fractions.

Table (3.5.) shows the nitrogen content for *Acacia senegal* to be 0.28% to 0.38 which agree with Anderson, (1986) and Omer, (2004).

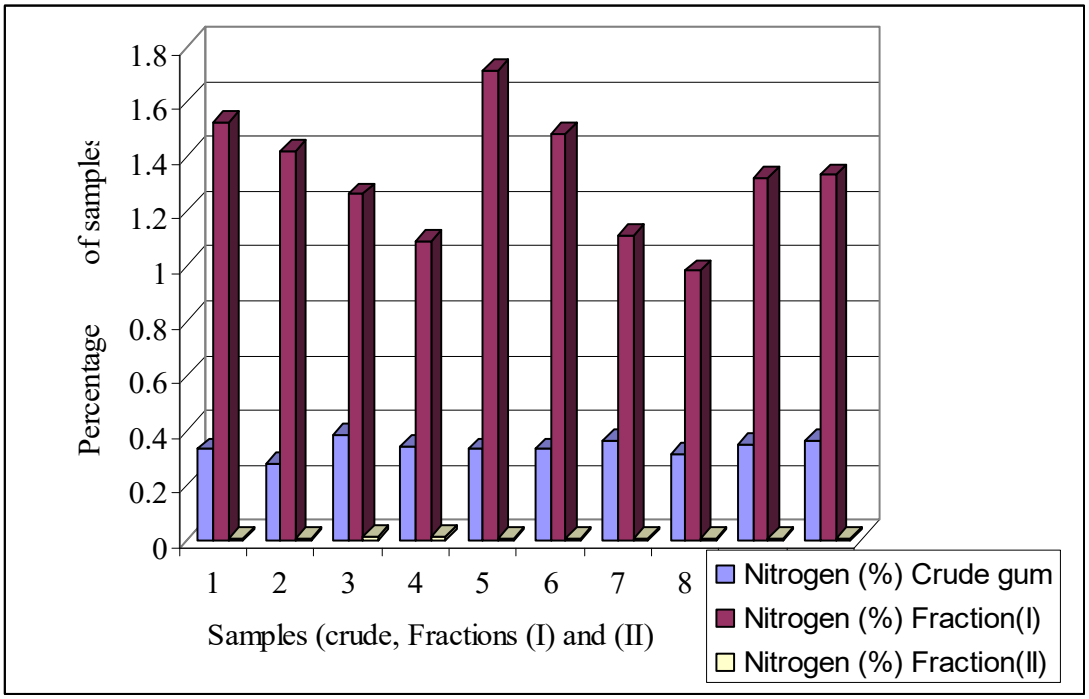
The same table show the nitrogen content for fraction (I) which 0.98% t0 1.71% which agreed with (Bashir. I. A, 2006)

The table shows the nitrogen content for fraction (II) which is 0.004% to 0. 13% which is agree with Bashir, (2006). Nitrogen and protein content for *Acacia senegal* gum agree with

Anderson, 1986 and Karam-Allah., 1998, and the protein content for the two fractions agreed with, Bashir. I. A (2006): Karam-Alla, K.A. *et al*., (1998).

Table (3.5.) Percentage of Nitrogen and Protein of the Crude gum and fraction (I) and (II)

Sample number	Nitrogen (%)			Protein (%)		
	Crude gum	Fraction(I)	Fraction(II)	Crude gum	Fraction(I)	Fraction(II)
Alobyed 1	0.33	1.52	0.007	2.17	10.032	0.0462
Alobyed 2	0.28	1.42	0.006	1.85	9.372	0.0396
Alobyed 3	0.38	1.26	0.009	2.508	8.316	0.0594
Senar 1	0.34	1.09	0.013	2.244	7.194	0.0858
Senar 2	0.33	1.71	0.004	2.178	11.286	0.0264
Senar 3	0.33	1.48	0.006	2.178	9.768	0.039
Westkordfan	0.36	1.11	0.007	2.376	7.326	0.0462
Westkordfan	0.31	0.98	0.006	2.046	6.648	0.0396
G.Acompany	0.35	1.32	0.005	2.310	8.712	0.033
G.Acompany	0.36	1.33	0.006	2.376	8.778	0.0396
Averge	0.337	1.322	0.0069	2.329	8.743	0.045



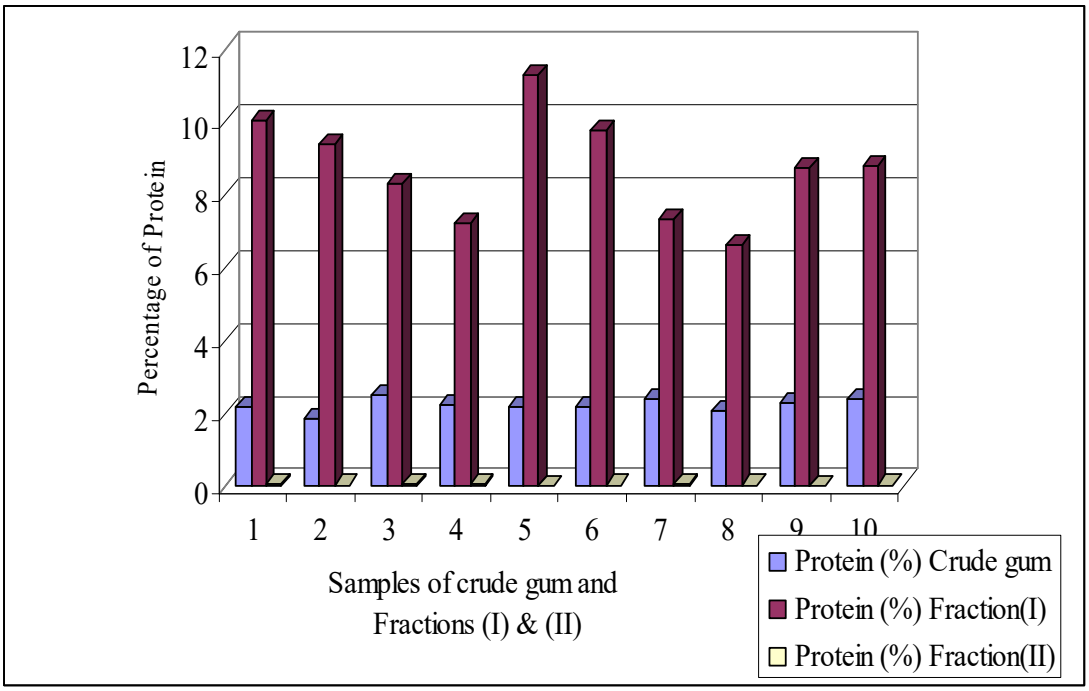


Fig.(3.5): Percentage of Nitrogen and Protein of the Crude gum and the fractions (I) and (II).

The chemical methods were used for estimation the amino acid content of gum Arabic samples (*Acacia senegal*).

Table (3.6) shows the percentage of amino acids content of acacia Senegal gum (Sample 1, 2, 3).

Gum Arabic is described by Anderson and Sroddart (1966), Street and Anderson (1983) and Phillips and Williams (1993) as a large molecule which a high molecular weight. It consist of the carbohydrate moieties L-rhamnose (12.8 -14%), L-arabinose (26-28%), D-galactose (40-44%) and D-glcuronic acid (15.5 -16%) and its 4-0 methyl derivative (1.5%) which form calcium, magnesium and potassium salts. The carbohydrate moieties covalently attached to protein backbone (approximately 250 which formed from Almandine (ala), arginine (arg), Aspartic acid (asp acid), Cystine (cyc), glutamic acid (glu), Glycine (gly), Histidine (His) hydroxyl proline (hyd-pro), isoleucine (iso-leu), lysine (lys), Methionine (met), phenylanine (phe), Proline (pro), serine (ser), Threonine (thre), Tyrosine (tyr), and valine (val) (Anderson *et al*., 1985).

Some Authurs suggested that gum Arabic is an arabino-galactan-protein complex, based on the integration and precipitation of the gum with Yariv's reagent (Yariv *et al*., 1962, 1967), an artificial carbohydrate antigen prepared by coupling diazotized 4-aminophenyl glycosides to tri-hydroxy benzene.

The precipitation reaction and the presence of the amino acids hydoxy-proline and serine as the major constituents of the proteinaceous component of the gum Arabic are two properties, which characterize the polysaccharide from gum Arabic as arabino galactan protein. (Akiyama Y, *et al* (1984).

Table (3.6.)Amino Acid content of *Acacia Senegal* gum

Description Amino Acid profile	Unit	Results according to sample source		
		senar	Alobyed	Westkordfan
Aspartic	%	0.25	0.25	0.23
Threonine	%	0.20	0.21	0.19
Serine	%	0.42	0.41	0.40
Glutamic	%	0.22	0.20	0.21
Hydroxy proline	%	19.03	20.00	19.52
Glycine	%	0.12	0.11	0.10
Alanine	%	0.15	0.16	0.15
Valine	%	0.19	0.16	0.15
Methionine	%	0.1	0.1	0.1
Isoleucine	%	0.1	0.1	0.1
Proline	%	4.85	5.00	4.91
Leucine	%	0.2	0.2	0.21
Tyrocine	%	0.05	0.05	0.06
Phenyl Alanine	%	0.26	0.25	0.24
Histadine	%	0.12	0.11	0.12
Lysine	%	0.25	0.25	0.24
Arginine	%	0.06	0.05	0.07

Table (3.7.) Amino Acid content of fraction (I) high protein content gum Arabic

Description Amino Acid profile	Unit	Results according to sample source		
		Senar	Alobyed	Westkordfan
Aspartic	%	0.19	0.20	0.21
Threonine	%	0.16	0.17	0.15
Serine	%	0.34	0.34	0.35
Glutamic	%	0.11	0.13	0.16
Hydroxy proline	%	0.06	0.07	0.09
Glycine	%	0.05	0.05	0.04
Alanine	%	0.10	0.15	0.10
Valine	%	0.18	0.18	0.18
Methionine	%	0.05	0.06	0.05
Isoleucine	%	0.07	0.07	0.07
Proline	%	0.02	0.02	0.03
Leucine	%	0.18	0.16	0.18
Tyrocine	%	0.03	0.04	0.03
Phenyl Alanine	%	0.23	0.23	0.23
Histadine	%	0.10	0.11	0.10
Lysine	%	0.20	0.21	0.20
Arginine	%	0.02	0.02	0.02

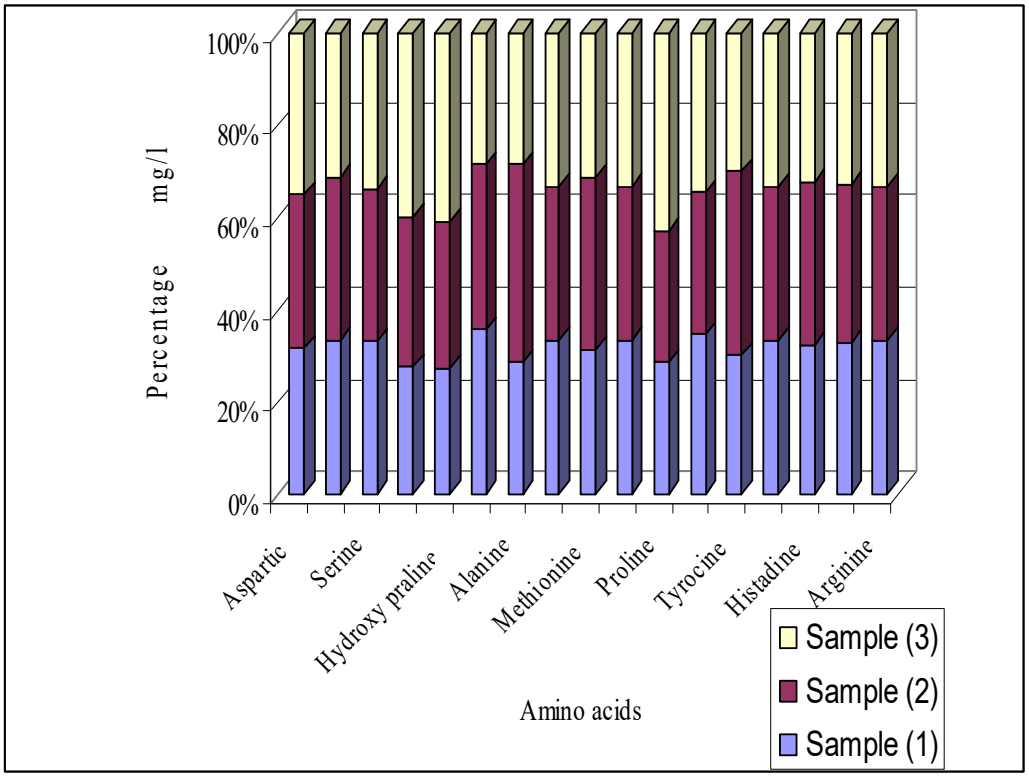


Fig. (3.6) Amino Acid content of fraction (I) high protein content gum Arabic

Amino acids have long been known to be involved in covalent moieties in gluco-proteins and roteogly-cans (Fincher it all, 1983)

(Lamport *et al.*, 1980), Allen *et al.*, 1978), Straham *et al.*, 1981).

Table (3.6.), (3.7.) and (3.8.) show the amino acid content of crude gum, fraction (1) high protein content) and fraction (II) low protein content respectively.

The amino acids content of crude gum show in Table (3.6) is in agree with (Anderson *et al.*, 1985; Lamport D.T.A. (1980) and Straham A., Amado, Rand Neukom H., (1981)

Table (3.7.) show the amino acid content of fraction (I). The table show great variation with Table (3.6.) in amino acids percentages. The hydroxy proline and proline percentage was very low when it compared with table (3.6.)

Chemically all *Acacia* gums are arabino-galactan-protein (AGP). They are group of macromolecules characterized by a high proportion of carbohydrate. The arabino-galactans are occur in covalent association with protein either as protcoglycans, in which the protein component carries a poyscacharide (constituent) (Anderson and Stoddart, 1966). Formation of the sugar-amino acid linkage is a crucial event in the biosynthesis of the carbohydrate units of glycoprotein.

It sets into motion a complex series of post translation enzymetic steps that lead to the formation of a host of protein-pound uligo-saccharides with diverse biological functions. (Robert., 2002).

Table (3.8.) Amino Acid content of fraction (I) low protein Content gum Arabic

Description Amino Acid profile	Unit	Results according to sample source		
		Senar	Alobyed	Westkordfan
Aspartic	%	0.50	0.40	0.50
Threonine	%	0.03	0.05	0.03
Serine	%	0.10	0.9	0.10
Glutamic	%	0.10	0.12	0.11
Hydroxy proline	%	10.05	9.85	10.00
Glycine	%	0.05	0.05	0.05
Alanine	%	0.04	0.03	-
Valine	%	-	-	-
Methionine	%	0.02	0.02	0.01
Isoleucine	%	0.02	0.02	0.02
Proline	%	3.21	2.25	3.00
Leucine	%	0.03	0.02	0.03
Tyrocine	%	0.02	0.02	0.02
Phenyl Alanin	%	0.03	0.02	0.03
Histadine	%	-	-	-
Lysine	%	0.02	0.02	0.02
Arginine	%	0.03	0.02	0.03

Table (3.8.) show the amino acid content of fraction (II) gum. Hydroxy proline and proline percentage was the highest of the amino acids.

The results fraction (I) and fraction (II) can give use idea about the glycopeptides bond in use idea about the glycol-peptide bond in gum Arabic (acacia Senegal gum) and how the sequence of amino acid involve in the structure of the glycol-proteins.

The arabino-galactan proteins (AGPs) are extra cellular hydroxyl proline – rich proteoglycans implicated in plant growth and development. The protein backbones of (AGPs) are rich in praline hydroxyl proline, serine, alanine, and theronine (Carolyn J. et al., 2002).

Amino acid fraction (I) is show significant decrease in the main constituent such as proline and hydroxyl-proline but Table (4.23) of amino acid in fraction (II) show significant decrease in proline and hydroxyl-proline. The main amino-acids in gum Arabic, while the rest of amino acids show no great variation in there percentage Vandeve and Fenyo (1985) reported that gum contained fractions of varying molecular masses. Those fractions were collected at different elution volumes and their physio-chemical properties were studied. The higher molar mass fractions were found to contain most of the proteinous material. It was suggested that the high molecular mass fraction. Which a count for about 30% of the Total gum was arabino-galacto-protein complex (Vandevelde and Fenyo, 1985).

According to Vandevelde and Fenyo, the higher molar mass was fraction (hight protein contents) which contains most of the protienous material. Anderson and Stoddard (1996) had previously shown that portentous material was associated with the high molecular mass fractions were mostly polysaccharides.

Later, studies were carried by Anderson and Mc. Doug (1987), revealed protein was present in all the degradation products, although the sugar to protein ratio was quite high at the core of the molecule (Hassan, 2000).

Most of the gum was fund to have low protein content and refer to as arabinogalactan AG. The fractions rich kin protein constitute 12% of the total gum and were refer to as arabinogalactan protein (AGP) and glycoprotein (GP). The later fraction (GP) has spartic acid as the dominating amino acid. Where as the other fractions have hydroxyl proline and serine as dominating amino acids. (William *et al*., 1990), Osman *et al*., (1990), using (gpc) separated gum into two fractions. One of them possesses higher molecular mass, represented 10% of the total gum was found is contain 10% protein. Qi, *et al* (1991) Randall *et al*., 1988). It was concluded that the sugar in fraction (II) was attached to the polypeptide chain by hydroxyl proline linkage.

Summary and Conclusion

The examination of samples from Acacia senegal obtained from various Sudanese sources showed that they possessed very similar chemical and physiochemical characteristics despite their different geographical origins.

The characteristics of all Acacia Senegal samples have been found to confirm to the literature data for gums from Acacia senegal.

Fractionation of gum Arabic from Acacia senegal by foaming method into two fractions, high protein content (fraction I) that represent 30% of the gum and low protein content (fraction II) which represent 70% of the gum.

The proximate analysis of the crude gum, fraction I and fraction II revealed that the moisture percentage of crude gum where in agree with literature.

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